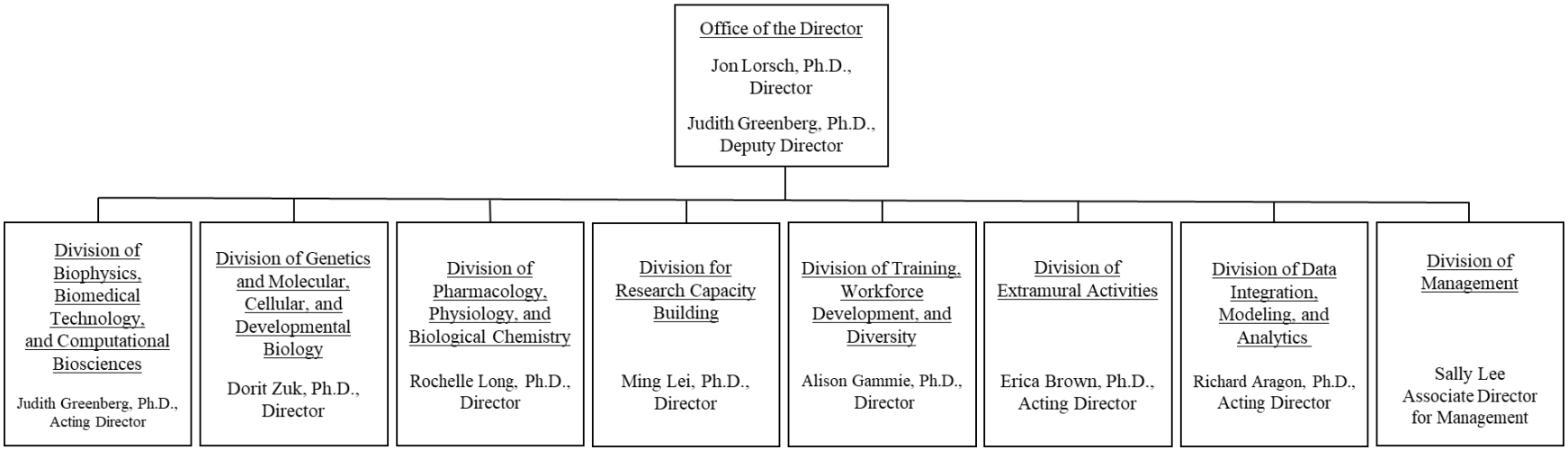
DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of General Medical Sciences (NIGMS)

National Institutes of Health
National Institute of General Medical Sciences

Organizational Chart



NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to general medical sciences, [$2,937,218,000]*$2,672,074,000*, of which [$1,230,821,000]*$741,000,000* shall be from funds available under section 241 of the PHS Act: *Provided*, That not less than [$386,573,000]*$351,781,000* is provided for the Institutional Development Awards program.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Amounts Available for Obligation[1]

(Dollars in Thousands)

Source of Funding	FY 2019 Final	FY 2020 Enacted	FY 2021 President's Budget
Appropriation	$2,872,780	$2,937,218	$2,672,074
Mandatory Appropriation: (non-add)			
Type 1 Diabetes	*(0)*	*(0)*	*(0)*
Other Mandatory financing	*(0)*	*(0)*	*(0)*
Rescission	0	0	0
Sequestration	0	0	0
Secretary's Transfer	-5,929	0	0
Subtotal, adjusted appropriation	$2,866,851	$2,937,218	$2,672,074
OAR HIV/AIDS Transfers	-44,971	0	0
HEAL Transfer from NINDS	0	0	0
Subtotal, adjusted budget authority	$2,821,880	$2,937,218	$2,672,074
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	$2,821,880	$2,937,218	$2,672,074
Unobligated balance lapsing	-74	0	0
Total obligations	$2,821,806	$2,937,218	$2,672,074

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2019 - $1,385 FY 2020 - $5,000 FY 2021 - $5,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2019 Final		FY 2020 Enacted		FY 2021 President's Budget		FY 2021 +/- FY 2020 Enacted	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	3,138	$1,235,390	3,388	$1,350,685	3,405	$1,277,057	17	-$73,628
Administrative Supplements	*(532)*	54,339	*(472)*	48,240	*(439)*	44,863	*(-33)*	-3,377
Competing:								
Renewal	271	106,701	233	95,477	198	75,339	-35	-20,138
New	921	381,514	877	359,173	744	283,420	-133	-75,753
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	1,192	$488,216	1,110	$454,650	942	$358,759	-168	-$95,891
Subtotal, RPGs	4,330	$1,777,944	4,498	$1,853,575	4,347	$1,680,679	-151	-$172,896
SBIR/STTR	206	93,033	209	94,413	190	85,735	-19	-8,678
Research Project Grants	4,536	$1,870,977	4,707	$1,947,988	4,537	$1,766,414	-170	-$181,574
Research Centers:								
Specialized/Comprehensive	146	$369,491	156	$393,731	141	$358,296	-15	-$35,435
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	31	50,945	29	47,065	26	42,828	-3	-4,237
Comparative Medicine	1	3,318	1	3,289	1	2,993	0	-296
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	178	$423,754	186	$444,085	168	$404,117	-18	-$39,968
Other Research:								
Research Careers	102	$29,573	113	$32,654	107	$31,015	-6	-$1,639
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	6,296	0	6,908	0	6,286	0	-622
Minority Biomedical Research Support	285	96,741	280	94,990	240	81,264	-40	-13,726
Other	212	85,106	226	90,365	206	82,305	-20	-8,060
Other Research	599	$217,716	619	$224,917	553	$200,870	-66	-$24,047
Total Research Grants	5,313	$2,512,446	5,512	$2,616,990	5,258	$2,371,401	-254	-$245,589
Ruth L Kirchstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	302	$16,800	286	$17,043	277	$15,509	-9	-$1,534
Institutional Awards	3,930	188,991	4,065	197,261	3,651	185,613	-414	-11,648
Total Research Training	4,232	$205,791	4,351	$214,304	3,928	$201,122	-423	-$13,182
Research & Develop. Contracts	21	$22,289	21	$22,779	19	$20,729	-2	-$2,050
(SBIR/STTR) (non-add)	*(0)*	*(991)*	*(0)*	*(1,013)*	*(0)*	*(922)*	*(0)*	*(-91)*
Intramural Research	0	3,979	0	4,145	0	3,772	0	-373
Research Management & Support (RMS)	172	77,375	184	79,000	184	75,050	0	-3,950
(SBIR Admin) (non-add)	*(0)*	*(3)*	*(0)*	*(3)*	*(0)*	*(3)*	*(0)*	*(-0)*
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIGMS	172	$2,821,880	184	$2,937,218	184	$2,672,074	0	-$265,144

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

Major Changes in the Fiscal Year 2021 Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. The FY 2021 President's Budget reflects the Administration's fiscal policy goals for the Federal Government. Within this framework, NIGMS will pursue its highest research priorities through strategic investments and careful stewardship of appropriated funds:

Research Project Grants (-$181.6 million; total $1,766.4 million):

For FY 2021 the funding of new and early stage investigators will remain a high priority. NIGMS will continue to prioritize the support of investigator-initiated Research Project Grants (RPGs). To offset the costs of an increase in the number of RPG commitments projected in FY 2021 from the ramping up of competing grants in previous years, the Institute plans to reduce noncompeting awards by 7.0 percent. Additionally, competing grants will be given a similar 7.0 percent reduction to average cost. The Competing RPG grant count is estimated to be 168 RPGs less than in FY 2020. This budget represents a 9.3 percent reduction to the overall RPG mechanism.

Research Center Grants (-$40.0 million; total $404.1 million):

In FY 2021, NIGMS will continue to maintain its research center grant portfolio. An overall 9.0 percent reduction to the center mechanism along with a 7.0 percent reduction to committed levels will be applied. Like the overall decrease for the Institute, the Institutional Development Award (IDeA) program will also receive a 9.0 percent reduction. The IDeA total program level in FY 2021 is $351.8 million.

Other Research (-$24.0 million; total $200.9 million):

This budget represents a 10.7 percent decrease due to the overall sub-mechanisms and programs being reduced by 9.0 percent (consistent with the overall decrease for the Institute) along with the second 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 Doctoral, from the Other sub-mechanism, to new programs under the Training mechanism. These 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. The second phase and fiscal year of moving these trainees and students to these innovative NIGMS programs will better equip the institute to assist and track these fellows along the various stages of their career. This will result in $16.0 million moving from MBRS and Other Research into Training.

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. The Career and Other Other sub-mechanism under Other Research will include a $1.3 million increase and $1.0 million for MOSAIC, respectively.

Ruth L. Kirchstein Training Awards (-$13.2 million; total $201.1 million):

Under this budget, Individual Fellowships receive a 9.0 percent reduction, similar to the overall NIGMS decrease. Institutional Training sees a 5.9 percent decrease due to $6.1 million transitioning from Other Research, as described above.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Summary of Changes

(Dollars in Thousands)

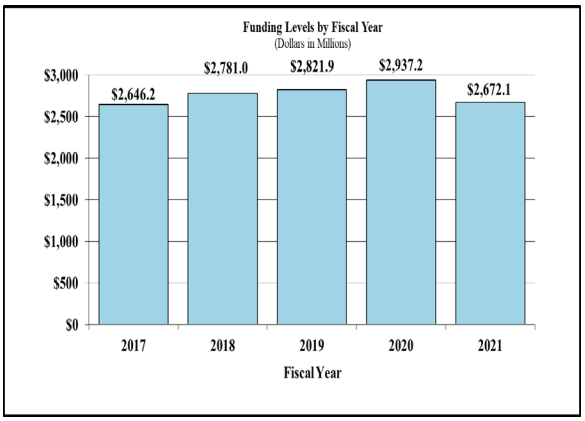
FY 2020 Enacted	$2,937,218
FY 2021 President's Budget	$2,672,074
Net change	-$265,144

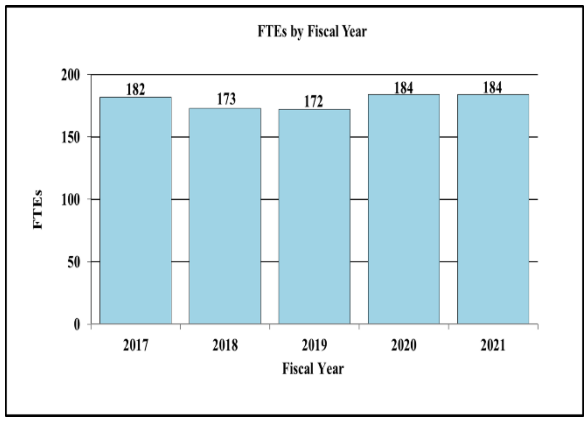
CHANGES	FY 2021 President's Budget FTEs	FY 2021 President's Budget Budget Authority	Change from FY 2020 Enacted FTEs	Change from FY 2020 Enacted Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2020 pay increase & benefits		$2,274		$16
b. January FY 2021 pay increase & benefits		2,274		26
c. Paid days adjustment		2,274		-9
d. Differences attributable to change in FTE		2,274		0
e. Payment for centrally furnished services		152		-8
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		1,346		16
Subtotal				$41
2. Research Management and Support:				
a. Annualization of January 2020 pay increase & benefits		$30,402		$192
b. January FY 2021 pay increase & benefits		30,402		474
c. Paid days adjustment		30,402		-113
d. Differences attributable to change in FTE		30,402		0
e. Payment for centrally furnished services		9,320		-491
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		35,328		602
Subtotal				$664
Subtotal, Built-in				$705

CHANGES	FY 2021 President's Budget No.	FY 2021 President's Budget Amount	Change from FY 2020 Enacted No.	Change from FY 2020 Enacted Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	3,405	$1,321,920	17	-$77,005
b. Competing	942	358,759	-168	-95,891
c. SBIR/STTR	190	85,735	-19	-8,678
Subtotal, RPGs	4,537	$1,766,414	-170	-$181,574
2. Research Centers	168	$404,117	-18	-$39,968
3. Other Research	553	200,870	-66	-24,047
4. Research Training	3,928	201,122	-423	-13,182
5. Research and development contracts	19	20,729	-2	-2,050
Subtotal, Extramural		$2,593,252		-$260,821
	FTEs		FTEs	
6. Intramural Research	0	$3,772	0	-$414
7. Research Management and Support	184	75,050	0	-4,614
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, Program	184	$2,672,074	0	-$265,849
Total changes				-$265,144

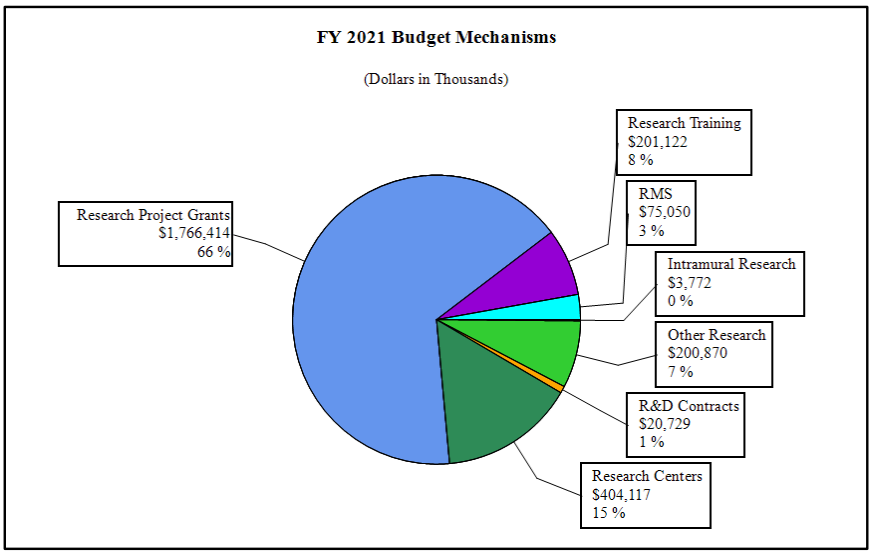
Fiscal Year 2021 Budget Graphs

History of Budget Authority and FTEs:

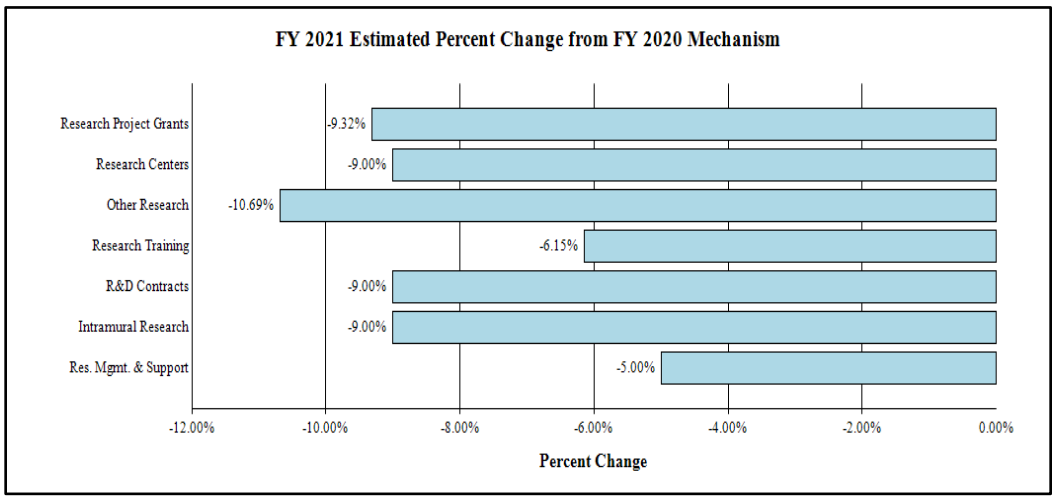




Distribution by Mechanism:



Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Authority by Activity[1]

(Dollars in Thousands)

	FY 2019 Final		FY 2020 Enacted		FY 2021 President's Budget		FY 2021 +/- FY2020	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Biophysics, Biomedical Technology, and Computational Biosciences		$549,307		$572,066		$519,788		-$52,279
Genetics and Molecular, Cellular, and Developmental Biology		842,773		877,691		797,483		-80,208
Pharmacology, Physiology and Biological Chemistry		575,934		599,796		544,984		-54,813
Training, Workforce Development and Diversity		323,908		337,328		306,501		-30,827
Division for Research Capacity Building		448,604		467,191		424,497		-42,695
Institutional Development Award (IDeA)		*(361,573)*		*(386,573)*		*(351,781)*		*(-34,792)*
Subtotal, Extramural		**$2,740,526**		**$2,854,073**		**$2,593,252**		**-$260,821**
Intramural Research	**0**	**$3,979**	**0**	**$4,145**	**0**	**$3,772**	**0**	**-$373**
Research Management & Support	**172**	**$77,375**	**184**	**$79,000**	**184**	**$75,050**	**0**	**-$3,950**
TOTAL	**172**	**$2,821,880**	**184**	**$2,937,218**	**184**	**$2,672,074**	**0**	**-$265,144**

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

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2020 Amount Authorized	FY 2020 Enacted	2021 Amount Authorized	FY 2021 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$2,937,218,000	Indefinite	$2,672,074,000
National Institute of General Medical Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$2,937,218,000		$2,672,074,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2012	$2,102,300,000	$2,102,300,000	$2,347,309,000	$2,434,637,000
Rescission				$4,601,464
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			

[1] Budget Estimate to Congress includes mandatory financing.

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 2019 Actual	FY 2020 Enacted	FY 2021 PB	FY 2021 + / - FY 2020
BA	$ 2,821,880,000	$2,937,218,000	$2,672,074,000	-265,144,000
FTE	172	184	184	0

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

Director's Overview

The National Institute of General Medical Sciences (NIGMS) has been and continues to be a powerful engine of scientific discovery and progress. NIGMS supports a broad spectrum of fundamental or "basic" research ranging from studies of organisms, cells, genes, and molecules to whole biological systems. Support of fundamental research yields tremendous dividends by increasing our understanding of various biological processes and thereby driving advances in disease prevention, detection, diagnosis, and treatment. In addition to its focus on supporting fundamental science, the Institute also supports research in specific clinical areas that affect multiple organ systems. An indicator of both the importance and impact of NIGMS-funded research is that NIGMS grantees have won 90 Nobel Prizes over the course of the Institute's history.

In addition to its support of fundamental biomedical research, NIGMS is committed to sustaining a talented, well-trained, robust, and diverse scientific workforce. The Institute's training and capacity building programs focus on training the next generation of scientists, enhancing the diversity of the scientific workforce, and building biomedical research capacity in states throughout the country where the level of NIH research support has been historically low.

Optimizing Support for Investigator-Initiated Research

Because it is impossible to predict when and where scientific advances or breakthroughs will originate, NIGMS has historically pursued a broad and varied array of scientific research areas. Such areas include, but are not restricted to, molecular, cellular, developmental, and computational biology; data science; chemistry and biochemistry; physiology and pharmacology; and genetics and biotechnology. In the past, NIGMS has supported these areas of research by utilizing a combination of grant mechanisms, such as investigator-initiated awards, program project grants, cooperative agreements, and a variety of larger, center-based grants and awards.

NIGMS prioritizes support for individual investigator-initiated research through R01 and R35 research project grant mechanisms. The NIGMS R35 Maximizing Investigators' Research Award (MIRA), for instance, is intended to optimize scientific creativity and flexibility, enhance the stability of overall support, reduce administrative burden, and promote early-stage

investigator inclusion in scientific research. The MIRA funding mechanism, now in its fifth year of operation, has funded 455 Early Stage Investigators (ESIs) and 533 Established Investigators (EIs) as of FY 2019. Through MIRA, scientists have been able to open new lines of inquiry and research, including, for example, areas associated with chromosomal rearrangement and induced pluripotent stem cells. In addition, MIRA has directly contributed to an 83 percent increase in the number of ESIs supported by NIGMS (e.g., 128 ESIs were funded in FY 2015 relative to 229 ESIs who were funded in FY 2019).

Looking toward the future, NIGMS plans to continue to support the full spectrum of investigator-initiated research by optimizing support for R01s and R35 MIRAs while also providing opportunities to support team science through the new Collaborative Program Grants for Multidisciplinary Teams (RM1).[1] This new approach to supporting team science will replace the array of different funding approaches used previously by the Institute and is designed to support more efficiently and effectively the studies of complex problems that require highly-integrated, multidisciplinary teams of investigators.

Enhancing Diversity in Graduate Education and the Academic Research Workforce

NIGMS has recognized the historical need for enhanced diversity and representation in the biomedical research enterprise and has thus maintained a strong commitment to the principles of equity, diversity, and inclusion. This commitment is reflected in the breadth and success of long-standing NIGMS programs that aim to increase both the number and competitiveness of biomedical and behavioral research scientists, including those from historically underrepresented groups, in a manner that cuts across disciplinary lines.

NIGMS supports several undergraduate- and graduate-level programs aimed at enhancing the diversity of students who receive doctoral degrees (e.g., Ph.D.s) in the biomedical sciences, including the Research Training Initiative for Student Enhancement (RISE), Maximizing Access to Research Careers (MARC), and Initiative for Maximizing Student Development (IMSD) programs.

NIGMS has been optimizing its diversity- and representation-enhancing efforts to ensure inclusion of multiple institutions and institution types throughout the country (e.g., T32 institutional training awards), participation of individuals from a wide variety of backgrounds (e.g., low socio-economic and/or rural backgrounds, or first-generation college students), as well as supporting multiple stages of the career pathway, including pre-undergraduate (e.g., the Science Education Partnership Awards, also known as SEPA).

Although the number of students from underrepresented (UR) groups receiving Ph.D.s in the biomedical sciences has increased significantly over the last 25 years due to both historical and current diversity enhancing efforts, the number of UR Ph.D.s in academic faculty positions has not increased proportionally.[2] Therefore, as a future target, NIGMS will direct efforts at filling

[1] https://www.nigms.nih.gov/grants/RM1/Pages/Collaborative-Program-Grant-for-Multidisciplinary-Teams-(RM1).aspx

[2] Gibbs, et al. eLife 2016, www.ncbi.nlm.nih.gov/pubmed/27852433; Meyers et al, PLOS One 2018, www.ncbi.nlm.nih.gov/pubmed/29338019

this critical need by facilitating career transitions that heighten diversity and representation in academic faculty positions at institutions throughout the country. For example, the recently launched Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program will focus on the transition of talented postdoctoral researchers from diverse backgrounds (including women) into independent faculty careers in research-intensive institutions.[3] The earliest start date for these awards is anticipated to be the fall of 2020.

Supporting Advancements in Biomedical Imaging

For over 20 years, NIGMS has helped advance the field of biomedical imaging by supporting the development, dissemination, and provision of access to various imaging technologies, equipment, and facilities. A growing number of imaging modalities and strategies have the potential to enable fundamental breakthroughs at the cellular and subcellular levels. These strategies will, in turn, lead to a heightened understanding of cellular structure and function and how disruptions in normal structure lead to disease states.

Two decades ago, cells could be visualized using light microscopes, while sub-cellular structures such as organelles and other intracellular components could be examined using black and white transmission electron microscopy (TEM). Researchers could assemble models of small- and medium-sized molecules using X-ray crystallography and nuclear magnetic resonance (NMR) spectroscopy.

Since that time, NIGMS has supported work that has catalyzed advances in these various imaging modalities. Crystallography techniques, for instance, can now determine much larger structures than previously possible. Researchers can also use color in TEM. Imaging of cellular structures is feasible at significantly higher levels of resolution. Current imaging techniques also allow for the tracking of individual (i.e., single) molecules within cells. Cryo-electron microscopy (the subject of the 2017 Nobel Prize in Chemistry, awarded to an NIGMS grantee and two other recipients[4]) and micro-electron diffraction, for instance, are comparatively newer techniques that simplify and improve the imaging of biomolecules.

Cellular imaging will continue to have a significant impact on biological research and our understanding of interactions between molecular components within the cell as well as the dynamics of single molecules in both normal and abnormal cells. As it has done previously, NIGMS will continue to expand and evolve the development, dissemination, and access to higher-resolution, next-generation, and cutting-edge imaging technologies, capabilities, and facilities. For example, NIGMS recently issued two Funding Opportunity Announcements for cryo-electron tomography service centers and an associated hub as part of the Common Fund Transformative Cryo-EM Initiative.[5] The evolution of these capabilities will have a significant

[3] https://loop.nigms.nih.gov/2019/03/early-notice-concept-clearance-for-the-maximizing-opportunities-for-scientific-and-academic-independent-careers-mosaic-program-ue5-and-k99-r00-to-promote-diversity-in-the-biomedical-research-work/

[4] NIH Grantee Wins 2017 Nobel Prize in Chemistry, NIH News Releases, October 4, 2017. https://www.nih.gov/news-events/news-releases/nih-grantee-wins-2017-nobel-prize-chemistry#overlay-context

[5] RFA-RM-19-009: Service Centers for Cryoelectron Tomography, June 21, 2019, https://grants.nih.gov/grants/guide/rfa-files/; RFA-RM-19-009.html; RFA-RM-19-010: Service Network Hub for Cryoelectron Tomography, June 21, 2019, https://grants.nih.gov/grants/guide/rfa-files/RFA-RM-19-010.html

impact on our understanding of biological processes and the diseases which affect or disrupt them.

Institutional Development and Capacity Building: Strengthening Rural Health Research

One of NIGMS' core programs is the Institutional Development Award (IDeA), which was established by congressional mandate in 1993 to broaden the geographic distribution of NIH funding. The IDeA program has pursued this objective by building research capacity at academic institutions in states that have historically received a disproportionately low level of NIH support. The program enhances the ability of investigators from these institutions to compete successfully for additional research funding while also serving the research needs of medically underserved communities in IDeA states.

The IDeA program currently consists of several well-established and widely-known funding initiatives, including the Centers of Biomedical Research Excellence (COBRE), the IDeA-state Networks of Biomedical Research Excellence (INBRE), and the IDeA Clinical and Translational Research (CTR) Network. Taken together, these initiatives support basic, translational, and clinical research, in addition to research training, faculty development, and research infrastructure improvements. The initiatives also address the needs of medically underserved communities in IDeA states. Recently, and as part of the continuing evolution of the IDeA program, NIGMS established the Regional Technology Transfer Accelerator Hubs for IDeA states in each of the four IDeA regions (central, northeast, southeast, and western regions).[6] These accelerator hubs provide both consulting services and skills development in entrepreneurship, technology transfer, small business finance, and other areas needed to transform important discoveries made in the laboratory into potentially viable commercial products that address human health.

Supporting research related to the specific health needs of unique populations within IDeA states is an important aspect of the IDeA program. Since most IDeA-eligible states include rural populations and in light of the ongoing opioid epidemic and other health-related challenges that are prevalent or evolving in rural America, NIGMS is looking to further strengthen its support of rural health research by focusing additional capacity in this area. IDeA-CTRs, for instance, will focus on statewide or multi-state infrastructures that address a broad spectrum of health-related challenges faced by the specific populations in IDeA states. Furthermore, COBRE programs that focus on rural health challenges and engage primary care physicians in Practice-Based Research Networks will be strongly encouraged.

Understanding and Leveraging the Potential of Stem Cells: iPSCs

Almost two decades ago, NIGMS began supporting the development of effective approaches and model systems for studying pluripotent stem cells; i.e., undifferentiated cells that can potentially produce any cell or tissue the body needs to repair itself. Since 2002, when NIGMS hosted its first Workshop on the Basic Biology of Mammalian Stem Cells, the Institute has supported a series of initiatives and meetings to understand better the unique properties of pluripotent stem cells and how these cells might be exploited as a model system to help advance the study of basic

[6] https://www.nigms.nih.gov/Research/mechanisms/Pages/STTR-Regional-Technology-Transfer.aspx

research problems. In 2007, NIGMS researchers were able to refine work in the area of stem cell biology with the fundamental discovery of reprogramming somatic adult cells (e.g., skin cells) into pluripotent stem cells, known as induced pluripotent stem cells (iPSCs).[7]

NIGMS currently supports – and will continue to support – research into iPSCs to understand better the unique properties of these cells and to consider how they might best be leveraged as model systems to advance further our understanding of basic research problems, their associated biology, and their relationship to human health. Specific examples include organ or limb regeneration, wound healing, and generation of model systems such as organoids to understand better human development and disease. In addition to work in academic laboratories, NIGMS is supporting research by small businesses aimed at improving iPSC technologies, including through a recent Small Business Innovation Research (SBIR) Funding Opportunity Announcement (FOA) that was led by NIGMS.[8]

Examples of NIGMS Achievements Since FY 2015

a. The number of ESIs receiving their first major competing NIGMS Research Project Grant (RPG) increased from 128 in FY 2015 to 229 in FY 2019, in part due to the introduction of the MIRA program in FY 2016.

b. NIGMS was able to support a record number of RPGs in FY 2019 (4,330 overall, 1,192 competing, and 3,138 noncompeting); these numbers represent an increase of approximately 15 percent above the number of RPGs supported in FY 2015 (3,754 overall, 1,074 competing, and 2,680 noncompeting).

c. The IDeA program was able to achieve targeted enhancements: The IDeA Clinical and Translational Research (IDeA-CTR) initiative promotes the advancement of clinical and translational research that addresses regional health challenges and concerns. Between FY 2015 and FY 2019, the number of IDeA-CTRs has increased from 3 to 11.

d. NIGMS launched its new technology development pipeline (see Program Portrait) and has already funded 93 high-risk, high-reward Exploratory R21 grants and 98 Focused Technology R&D R01 grants.

e. NIGMS provided $21 million in funding to the National Cryo-Electron Microscopy Centers (see Program Portrait) to allow each of them to acquire an additional microscope, significantly enhancing their ability to provide access to this cutting-edge technology to researchers across the country, regardless of the institution or state in which they work. The Institute also provided funding to 26 institutions to acquire or refurbish helium recycling systems for their high-end instrumentation that requires liquid helium (e.g., magnetic resonance imaging (MRIs)). This program met a critical need caused by the

[7] Yu J, Vodyanik MA, Smuga-Otto K, Antosiewicz-Bourget J, Frane JL, Tian S, Nie J, Jonsdottir GA, Ruotti V, Stewart R, Slukvin II, Thomson JA., Induced pluripotent stem cell lines derived from human somatic cells., Science. 2007 DOI: 10.1126/science.1151526

[8] RFA: Methods to Improve Reproducibility of Human iPSC Derivation, Growth and Differentiation (SBIR), May 21, 2019, https://grants.nih.gov/grants/guide/rfa-files/RFA-GM-19-001.html

worldwide helium shortage, and it is estimated that it will pay for itself in cost savings to institutions within four years.

Overall Budget Policy: The FY 2021 President's Budget request for NIGMS is $2,672.1 million, a decrease of $265.1 million or 9.0 percent compared to the FY 2020 Enacted level.

Program Descriptions and Accomplishments

Genetics and Molecular, Cellular, and Developmental Biology (GMCDB): The GMCDB division supports research to understand the structure and function of cells and cellular components, and 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. To complement GMCDB's substantial investment in research that is performed in a wide variety of research organisms, GMCDB will also employ FY 2020 funds to bolster human research studies aimed at revealing the generalizable principles of the genetics of human biology and human disease.

Budget Policy: The FY 2021 President's Budget request for the GMCDB program is $797.5 million, a decrease of $80.2 million or 9.1 percent compared to the FY 2020 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. Research supported by the division takes a multifaceted approach to problems in pharmacology, physiology, biochemistry, and biological chemistry that are very basic in nature. The goals of supported 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, injury, and critical illness. 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 2021 President's Budget request for the PPBC program is $545.0 million, a decrease of $54.8 million or 9.1 percent compared to the FY 2020 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 and computational research and the development and application of biophysical and computational methods and tools, such as analytical methods, mathematical modeling, and simulations. This year, major new efforts in BBCB include enhancement of support for data resources and artificial intelligence approaches (e.g., computational facilities, software, and machine learning) to address fundamental biomedical research questions. 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. Another major new effort in BBCB is to support technology development through all stages – from high-risk, high-reward emerging concepts to providing established biomedical resources at the national and regional levels. BBCB-supported technology resources, used by thousands of U.S. scientists each year, enable cutting-edge biomedical research.

Budget Policy: The FY 2021 President's Budget request for the BBCB program is $519.8 million, a decrease of $52.3 million or 9.1 percent compared to the FY 2020 Enacted level. BBCB plans to fund investigator-initiated approaches to enable the development of new and emerging 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. 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 Diversity, and the National Research Mentoring Network. 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. In FY 2020, TWD will offer a new program called "Maximizing Opportunities for Scientific and Academic Independent Careers." 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 2021 President's Budget request for the TWD program is $306.5 million, a decrease of $30.8 million or 9.1 percent compared to the FY 2020 Enacted level. TWD will continue to support Individual and Institutional Training awards and maintain the same stipend levels as FY 2020.

Division for Research Capacity Building (DRCB): DRCB administers four major programs that support research, research infrastructure improvement, faculty development, and research training. The Institutional Development Award (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 initiatives: (1) the COBRE initiative aims to develop thematic, multidisciplinary centers; (2) the INBRE initiative supports the establishment of statewide networks for expanding research access and capabilities; (3) the IDeA CTR initiative promotes the advancement of clinical and translational research that addresses regional health concerns; (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 skills needed to move discoveries and technologies out of the lab and into commercial products that address human health. The Support of Competitive Research (SCORE) program seeks to increase the research competitiveness of faculty at institutions that have an explicitly stated historical mission focused on serving students from underrepresented groups. The Native American Research Centers for Health program supports partnerships between American Indian/Alaska Native tribes or tribally-based organizations and institutions that conduct intensive biomedical research. The 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.

Budget Policy: The FY 2021 President's Budget request for the DRCB program is $424.5 million, a decrease of $42.7 million or 9.1 percent compared to the FY 2020 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.

Intramural Research: NIGMS has a small but unique intramural research training program, the NIGMS Postdoctoral Research Associate (PRAT) Program. PRAT postdoctoral research fellows are supported for up to three years. They pursue independent research in intramural NIH laboratories under the guidance of tenured/tenure-track investigators, and they receive specialized training and career mentoring from NIGMS staff. Fellows, in this highly regarded program, have received numerous honors and awards for their innovative research in areas ranging from cell and molecular biology to pharmacology and genetics.

Budget Policy: The FY 2021 President's Budget request for the Intramural Research program is $3.8 million, a decrease of $373,000 or 9.0 percent compared to the FY 2020 Enacted level.

Research Management and Support (RMS): RMS provides administrative, budgetary, logistical, and scientific support toward the review, award, and monitoring of researching grants, training awards, and research and development contracts. RMS funds also support strategic planning, coordination, and evaluation of NIGMS programs; regulatory compliance; and coordination and engagement with other Federal agencies, Congress, and the public. RMS continues to fund enhancements in enterprise IT tools to facilitate the paylist process, where grant applications are discussed and prioritized for possible funding. Utilizing Natural Language Processing (NLP), artificial intelligence (AI), and additional RMS support, funds are allocated to larger enterprise applications that facilitate business process improvements as they relate to

grants program management, NIGMS application receipt, and internal grant approval. RMS funds are also used to capture and report on NIGMS-funded scientific career training data and associated outcomes. RMS allows for the expansion of NIGMS' presence in the enterprise cloud environment. Development in a cloud environment results in reduced resource dependencies, significant cost savings, and enhanced cybersecurity and disaster recovery, as well as ensuring compliance with the Federal Information Technology Acquisition Reform Act.

Budget Policy: The FY 2021 President's Budget request for RMS is $75.1 million, a decrease of $4.0 million or 5.0 percent compared to the FY 2020 Enacted level.

Program Portrait on Technology Development: From Research to Resource

Consider a few modern technologies—electricity, airplanes, grocery stores, construction cranes, smartphones. These build communities, enable progress, and improve lives. In the same way, scientific tools and technologies foster biomedical advances that improve human health. For example, genome sequencing technology reveals the basis of a wide range of human diseases. Powerful microscopes allow us to see living tissues, diagnose diseases, and conduct specialized surgeries. None of today's high-tech diagnostic and treatment abilities would be possible without the tools that enable them.

More generally, technology development is a major driver of economic growth and productivity. New technologies spark the creation of new industries, introduce labor-saving inventions, and create job opportunities. A specific objective of the NIGMS Strategic Plan[9] is to support access to essential research resources and the development of new technologies that enable novel scientific advances.

NIGMS has long funded the development of new scientific technologies. These include equipment, laboratory techniques, chemical and molecular tools, databases, software, and materials repositories. Some of these resources originated as research tools but are now widely used in clinical settings. Examples include mass spectrometry, which is used to analyze urine and blood samples, and magnetic resonance imaging (MRI), a diagnostic tool that reveals the body's soft internal organs without invasive surgery. The Institute also supports efforts to transform new technologies into reliable and robust resources that are available to a large community of researchers.

For a technology to mature fully, its developers must overcome a series of hurdles. These hurdles include demonstrating that the underlying concept is feasible, building a working prototype, and disseminating the product. To support promising technologies, especially at these critical stages, NIGMS has created a spectrum of funding opportunities that it is calling a "technology development pipeline." Collectively, these programs can provide uninterrupted support for innovative tools and technologies over the entire span of their development.

NIGMS has nurtured intriguing ideas at their very earliest stages since 2017 using Exploratory Research for Technology Development (R21) awards. Dozens of projects are now funded under this program, including some focused on finding new ways to study and edit genes.

Also in 2017, NIGMS created the Focused Technology Research and Development (R01) program to support promising young technologies until they have a working prototype. Nearly 100 projects are currently funded. Among them are some designed to enhance the super-resolution microscopy techniques that earned their developers the 2014 Nobel Prize in Chemistry.

Some technologies offer advantages to large research communities. To help such technologies mature into robust resources, NIGMS offers its Biomedical Technology Research Resource (BTRR) (P41) program. BTRR centers take critical, often unique technology and methods at the forefront of their respective fields (e.g., computing and informatics, molecular and cellular imaging, structural biology, and systems biology) and apply them to a broad range of basic, translational, and clinical research. Many of the BTRR projects aim to understand better and visualize biological molecules using techniques such as mass spectrometry, nuclear magnetic resonance (which is based on the same concept as MRI), and high-resolution microscopy.

[9] NIGMS 5-Year Strategic Plan, March 2015. https://publications.nigms.nih.gov/strategic plan/NIGMS-strategic-plan.pdf

Additionally, for scientific technologies that promise commercial success, NIGMS offers support through Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) awards. Since their launch (SBIR in 1982 and STTR in 1992), these government-wide programs have supported a range of products, technologies, and companies. Genzyme, now one of the world's leading biotech companies, received SBIR funding from NIGMS in 1990. A more recent NIGMS-funded SBIR project is a spinal needle insertion system designed to improve how doctors give regional anesthesia during medical procedures.

Finally, in June 2019, NIGMS posted the Limited Competition: NIGMS National and Regional Resources (R24) award. These awards are intended to ensure key, NIGMS-supported resources remain up-to-date and readily accessible to researchers. Although the Institute has not yet made any awards under the program, eligible resources could include microscopy centers, protein structure determination methods, materials and organism repositories, computational facilities, or software.

New scientific resources—whether electronic, physical, or intellectual—accelerate biomedical progress, drive economic growth, and ultimately benefit society. NIGMS has been a leader in nurturing, developing, and disseminating a wide range of such tools. With its newly established technology development pipeline, the Institute promises to continue supporting innovative technologies for years to come.

Case Studies in Technology Development

A mature technology: Synchrotron beamlines

Over the past 20 years, NIGMS has invested heavily in synchrotron technology. Synchrotrons are large facilities that generate intense beams of X-rays and other forms of light for scientific research. They operate around the clock and are used by thousands of researchers worldwide to make discoveries in biology, medicine, physics, geology, material engineering, nanotechnology, and other fields.

Here's how they work: Enormous magnets force electrons to whiz around a huge, hollow metal ring at nearly the speed of light. The electrons emit radiation energy, including powerful X-ray beams. At strategic locations around the ring, magnets direct the radiation out along a straight path (beamline) into an experimental station, where it is used for research.

Each beamline is tailor-made to capture specific kinds of energy for a particular type of research. NIGMS supports beamlines at five synchrotrons across the country, most of which are at National Labs. Through a Limited Competition: NIGMS Mature Synchrotron Resources for Structural Biology (P30) award, NIGMS is ensuring that these beamlines remain up-to-date and provide the best possible service to the research community.

A rising star: Cryo-EM

A powerful type of microscopy called cryo-electron microscopy (cryo-EM) is revolutionizing how scientists study cells and molecules, including disease-causing proteins and life-saving drugs. The subject of the 2017 Nobel Prize in Chemistry, cryo-EM enables scientists to visualize structures within cells and to see the arrangement of atoms within viruses, molecular assemblies, and individual proteins. The process uses liquid nitrogen and other substances to flash-freeze thin samples to around -193 degrees Celsius (-379 degrees Fahrenheit). Unlike X-ray crystallography, cryo-EM doesn't require molecules to be crystallized before their structures can be determined, a major advantage of the approach. Another advantage is that the technique doesn't require chemical preservatives, fixatives, or dyes. Once used by only a handful of labs, cryo-EM services and expertise are becoming available to the broader scientific community via NIH-supported service centers.

An emerging resource: CryoET
NIGMS has a particular interest in scaling up cryo-electron tomography (cryoET), which is a spin-off of cryo-EM. With it, scientists can create high-resolution three-dimensional images of molecules inside intact cells by computationally combining thousands of cryo-EM images, each photographed from a different angle. In June 2019, NIGMS posted two Common Fund programs to encourage the widespread use of cryoET: Service Centers for Cryoelectron Tomography (U24) and Service Network Hub for Cryoelectron Tomography (U24) awards.

A commercialized technology: ABS
The Air Barrier System (ABS) is an example of a successfully commercialized NIGMS-supported SBIR project. The ABS is a small, affordable device that tackles a major public health issue—surgical-site infections. Surgical-site infections are especially common following implant surgeries such as hip and knee replacements. Airborne contaminants are a common cause of these infections. In a small clinical trial, the ABS significantly reduced the risk of infection during implant surgeries by gently emitting HEPA-filtered air over the incision site, preventing airborne particles and bacteria from entering the surgical site.

The ABS is cleared by the U.S. Food and Drug Administration for use in hip and posterior spine surgery. The filter unit sells for $3900. The disposable (one-time-use) sterile components cost $200 to $250. The device was developed and is being sold by Nimbic Systems, Inc., in Stafford, Texas.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Authority by Object Class[1],[2]

(Dollars in Thousands)

		FY 2020 Enacted	FY 2021 President's Budget	FY 2021 +/- FY 2020
Total compensable workyears:				
	Full-time equivalent	184	184	0
	Full-time equivalent of overtime and holiday hours	184	184	0
	Average ES salary	$196	$196	$0
	Average GM/GS grade	13.1	13.1	0.0
	Average GM/GS salary	$128	$129	$1
	Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	$0	$0	$0
	Average salary of ungraded positions	$202	$205	$2
	OBJECT CLASSES	**FY 2020 Enacted**	**FY 2021 President's Budget**	**FY 2021 +/- FY 2020**
	Personnel Compensation			
11.1	Full-Time Permanent	19,060	19,279	219
11.3	Other Than Full-Time Permanent	2,677	2,708	31
11.5	Other Personnel Compensation	491	497	6
11.7	Military Personnel	0	0	0
11.8	Special Personnel Services Payments	1,949	1,972	22
11.9	**Subtotal Personnel Compensation**	**$24,177**	**$24,455**	**$278**
12.1	Civilian Personnel Benefits	7,912	8,221	309
12.2	Military Personnel Benefits	0	0	0
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$32,089**	**$32,676**	**$587**
21.0	Travel & Transportation of Persons	460	409	-50
22.0	Transportation of Things	1	1	0
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Others	45	41	-5
23.3	Communications, Utilities & Misc. Charges	145	130	-15
24.0	Printing & Reproduction	0	0	0
25.1	Consulting Services	301	270	-31
25.2	Other Services	5,440	4,910	-531
25.3	Purchase of goods and services from government accounts	86,160	81,865	-4,296
25.4	Operation & Maintenance of Facilities	1,275	1,145	-130
25.5	R&D Contracts	753	768	15
25.6	Medical Care	0	0	0
25.7	Operation & Maintenance of Equipment	8,330	7,478	-852
25.8	Subsistence & Support of Persons	0	0	0
25.0	**Subtotal Other Contractual Services**	**$102,260**	**$96,435**	**-$5,824**
26.0	Supplies & Materials	128	115	-13
31.0	Equipment	2,630	2,360	-269
32.0	Land and Structures	0	0	0
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	1,568,639	1,798,906	230,267
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	**$1,674,308**	**$1,898,398**	**$224,090**
	Total Budget Authority by Object Class	**$1,706,397**	**$1,931,074**	**$224,677**

[1] Includes FTEs whose payroll obligations are supported by the NIH Common Fund.
[2] Excludes obligations financed by reimbursable authority under Section 241 of the PHS Act.

NATIONAL INSTITUTES OF HEALTH
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Salaries and Expenses

(Dollars in Thousands)

OBJECT CLASSES	FY 2020 Enacted	FY 2021 President's Budget	FY 2021 +/- FY 2020
Personnel Compensation			
Full-Time Permanent (11.1)	$19,060	$19,279	$219
Other Than Full-Time Permanent (11.3)	2,677	2,708	31
Other Personnel Compensation (11.5)	491	497	6
Military Personnel (11.7)	0	0	0
Special Personnel Services Payments (11.8)	1,949	1,972	22
Subtotal Personnel Compensation (11.9)	**$24,177**	**$24,455**	**$278**
Civilian Personnel Benefits (12.1)	$7,912	$8,221	$309
Military Personnel Benefits (12.2)	0	0	0
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$32,089**	**$32,676**	**$587**
Travel & Transportation of Persons (21.0)	$460	$409	-$50
Transportation of Things (22.0)	1	1	0
Rental Payments to Others (23.2)	45	41	-5
Communications, Utilities & Misc. Charges (23.3)	145	130	-15
Printing & Reproduction (24.0)	0	0	0
Other Contractual Services:			
Consultant Services (25.1)	21	19	-2
Other Services (25.2)	5,440	4,910	-531
Purchases from government accounts (25.3)	67,667	63,002	-4,665
Operation & Maintenance of Facilities (25.4)	1,275	1,145	-130
Operation & Maintenance of Equipment (25.7)	8,330	7,478	-852
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$82,734**	**$76,553**	**-$6,181**
Supplies & Materials (26.0)	$128	$115	-$13
Subtotal Non-Pay Costs	**$83,513**	**$77,249**	**-$6,264**
Total Administrative Costs	**$115,602**	**$109,925**	**-$5,677**

NATIONAL INSTITUTES OF HEALTH
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Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2019 Final			FY 2020 Enacted			FY 2021 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division for Research Capacity Building									
Direct:	10	-	10	11	-	11	11	-	11
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	10	-	10	11	-	11	11	-	11
Division of Biophysics, Biomedical Technology, and Computational Biosciences									
Direct:	11	-	11	12	-	12	12	-	12
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	11	-	11	12	-	12	12	-	12
Division of Data, Integration, Modeling and Analytics									
Direct:	-	-	-	10	-	10	10	-	10
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	-	-	-	10	-	10	10	-	10
Division of Extramural Activities									
Direct:	-	-	-	67	-	67	67	-	67
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	-	-	-	67	-	67	67	-	67
Division of Genetics and Molecular, Cellular, and Developmental Biology									
Direct:	15	-	15	17	-	17	17	-	17
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	15	-	15	17	-	17	17	-	17
Division of Management									
Direct:	-	-	-	37	-	37	37	-	37
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	-	-	-	37	-	37	37	-	37
Division of Pharmacology, Physiology and Biological Chemistry									
Direct:	13	-	13	15	-	15	15	-	15
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	13	-	13	15	-	15	15	-	15
Division of Training, Workforce Development and Diversity									
Direct:	12	-	12	12	-	12	12	-	12
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	12	-	12	12	-	12	12	-	12
Office of Administrative Management									
Direct:	32	-	32	-	-	-	-	-	-
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	32	-	32	-	-	-	-	-	-
Office of Extramural Activities									
Direct:	48	-	48	-	-	-	-	-	-
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	48	-	48	-	-	-	-	-	-
Office of Scientific Review									
Direct:	14	-	14	-	-	-	-	-	-
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	14	-	14	-	-	-	-	-	-
Office of the Director									
Direct:	17	-	17	3	-	3	3	-	3
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	17	-	17	3	-	3	3	-	3
Total	172	-	172	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
2017	12.7
2018	12.8
2019	12.9
2020	13.1
2021	13.1

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Detail of Positions[1]

GRADE	FY 2019 Final	FY 2020 Enacted	FY 2021 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	190,027	195,918	195,918
GM/GS-15	18	16	16
GM/GS-14	64	75	75
GM/GS-13	53	56	56
GS-12	10	3	3
GS-11	2	6	6
GS-10	0	0	0
GS-9	5	1	1
GS-8	4	4	4
GS-7	8	8	8
GS-6	0	0	0
GS-5	0	0	0
GS-4	0	0	0
GS-3	0	0	0
GS-2	1	1	1
GS-1	0	0	0
Subtotal	165	170	170
Grades established by Act of July 1, 1944 (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	166	171	171
Total positions, end of year	188	197	197
Total full-time equivalent (FTE) employment, end of year	172	184	184
Average ES salary	190,027	195,918	195,918
Average GM/GS grade	12.9	13.1	13.1
Average GM/GS salary	124,013	127,858	129,328

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