DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

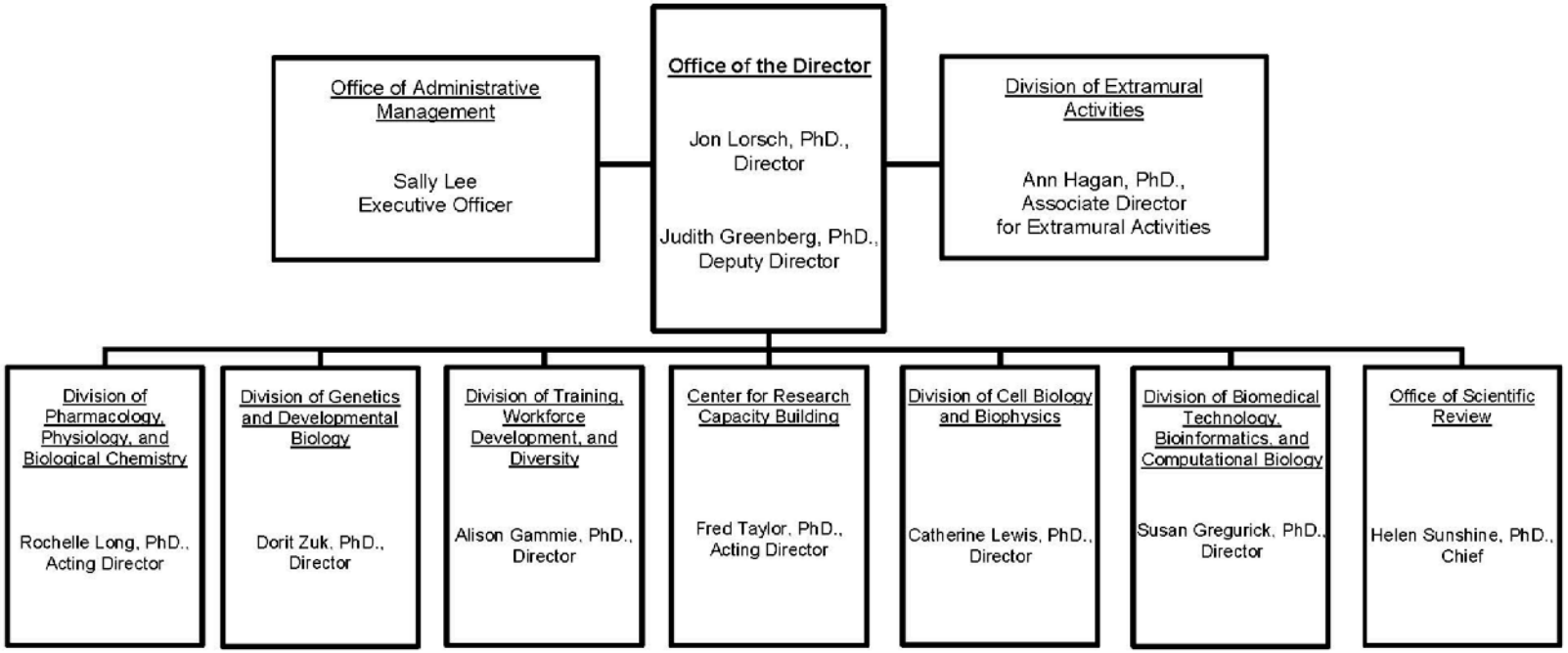
National Institute of General Medical Sciences (NIGMS)

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NOTE: The FY 2016 Enacted funding amounts cited throughout this chapter reflect the effects of OAR HIV/AIDS Transfers.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Organization Structure



NATIONAL INSTITUTES OF HEALTH

National Institute of General Medical Sciences

For carrying out section 301 and title IV of the PHS Act with respect to general medical sciences, [$2,512,073,000]*$2,434,144,000*, of which [$780,000,000]*$847,489,000* shall be from funds available under section 241 of the PHS Act[: Provided, That not less than $320,840,000 is provided for the Institutional Development Award program].

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Amounts Available for Obligation[1]

(Dollars in Thousands)

Source of Funding	FY 2015 Actual	FY 2016 Enacted	FY 2017 President's Budget
Appropriation	$2,371,476	$2,512,073	$2,512,437
Mandatory Appropriation: (non-add)			
Type 1 Diabetes	*(0)*	*(0)*	*(0)*
Other Mandatory financing	*(0)*	*(0)*	*(78,293)*
Rescission	0	0	0
Sequestration	0	0	0
FY 2015 First Secretary's Transfer	0	0	0
FY 2015 Second Secretary's Transfer	0	0	0
Subtotal, adjusted appropriation	$2,371,476	$2,512,073	$2,512,437
OAR HIV/AIDS Transfers	825	364	0
National Children's Study Transfers	0	0	0
Subtotal, adjusted budget authority	$2,372,301	$2,512,437	$2,512,437
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	$2,372,301	$2,512,437	$2,512,437
Unobligated balance lapsing	-102	0	0
Total obligations	$2,372,199	$2,512,437	$2,512,437

[1] Excludes the following amounts for reimbursable activities carried out by this account:
FY 2015 - $715,652 FY 2016 - $785,000 FY 2017 - $852,489

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2015 Actual		FY 2016 Enacted		FY 2017 President's Budget[3]		FY 2017 +/- FY 2016	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	2,680	$999,741	2,619	$983,638	2,925	$1,130,232	306	$146,594
Administrative Supplements	*(311)*	27,361	*(311)*	27,359	*(91)*	8,000	*(-220)*	-19,359
Competing:								
Renewal	405	163,464	447	191,301	344	147,196	-103	-44,105
New	667	241,008	737	282,050	567	217,022	-170	-65,028
Supplements	2	422	2	494	2	380		-114
Subtotal, Competing	1,074	$404,894	1,186	$473,845	913	$364,598	-273	-$109,247
Subtotal, RPGs	3,754	$1,431,997	3,805	$1,484,842	3,838	$1,502,830	33	$17,988
SBIR/STTR	161	65,028	182	73,684	193	77,901	11	4,217
Research Project Grants	3,915	$1,497,024	3,987	$1,558,526	4,031	$1,580,731	44	$22,205
Research Centers:								
Specialized/Comprehensive	160	$349,452	175	$390,243	169	$372,735	-6	-$17,508
Clinical Research								
Biotechnology	35	61,141	35	63,831	33	61,023	-2	-2,808
Comparative Medicine	1	3,293	1	3,308	1	3,308		
Research Centers in Minority Institutions								
Research Centers	196	$413,887	211	$457,382	203	$437,066	-8	-$20,316
Other Research:								
Research Careers	91	$23,898	95	$24,950	95	$24,950		
Cancer Education								
Cooperative Clinical Research								
Biomedical Research Support								
Minority Biomedical Research Support	270	98,050	276	102,364	276	102,364		
Other	148	40,972	199	46,434	199	46,434		
Other Research	509	$162,920	570	$173,748	570	$173,748		
Total Research Grants	4,620	$2,073,831	4,768	$2,189,656	4,804	$2,191,545	36	$1,889
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	368	$17,753	398	$19,681	398	$19,681		
Institutional Awards	3,731	175,616	3,801	195,851	3,801	195,851		
Total Research Training	4,099	$193,368	4,199	$215,532	4,199	$215,532		
Research & Develop. Contracts	26	$35,099	23	$32,696	25	$30,196	2	-$2,500
(SBIR/STTR) (non-add)[2]		*(3,532)*		*(1,587)*		*(1,587)*		
Intramural Research	5	$3,436		$4,101		$3,553		-$548
Res. Management & Support	176	66,567	183	70,452	183	71,611		1,159
Res. Management & Support (SBIR Admin) (non-add)[2]		*(49)*		*(11)*				*(-11)*
Office of the Director - Appropriation[2]								
Office of the Director - Other								
ORIP/SEPA (non-add)[2]								
Common Fund (non-add)[2]								
Buildings and Facilities								
Appropriation								
Type 1 Diabetes								
Program Evaluation Financing		-715,000		-780,000		-847,489		-67,489
Cancer Initiative Mandatory Financing								
Other Mandatory Financing						-78,293		-78,293
Subtotal, Labor/HHS Budget Authority		**$1,657,301**		**$1,732,437**		**$1,586,655**		**-$145,782**
Interior Appropriation for Superfund Res.								
Total, NIH Discretionary B.A.		**$1,657,301**		**$1,732,437**		**$1,586,655**		**-$145,782**
Type 1 Diabetes								
Proposed Law Funding								
Cancer Initiative Mandatory Financing								
Other Mandatory Financing						78,293		78,293
Total, NIH Budget Authority		**$1,657,301**		**$1,732,437**		**$1,664,948**		**-$67,489**
Program Evaluation Financing		715,000		780,000		847,489		67,489
Total, Program Level		**$2,372,301**		**$2,512,437**		**$2,512,437**		

[1] All Subtotal and Total numbers may not add due to rounding.
[2] All numbers in italics and brackets are non-add.
[3] Includes mandatory financing.

Major Changes in the Fiscal Year 2017 Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that there may be overlap between budget mechanism and activity detail and these highlights will not sum to the total change for the FY 2017 President's Budget for NIGMS, which is the same as the FY 2016 Enacted level.

Research Project Grants (+$22.205 million; total $1,580.731 million):
In FY 2017, NIGMS will increase support of investigator-initiated research across the entire portfolio in competing and non-competing RPGs. Additionally, the NIH-wide Small Business Innovation Research and Small Business Technology Transfer set aside increase is reflected in the RPG total.

Research Center Grants (-$20.316 million; total $437.066 million):
In FY 2017, NIGMS will continue to maintain its center grant portfolio, but will see a reduction in commitments in systems biology, biomedical technology, and structural biology.

NATIONAL INSTITUTES OF HEALTH
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Summary of Changes

(Dollars in Thousands)

FY 2016 Enacted	$2,512,437
FY 2017 President's Budget	$2,512,437
Net change	$0

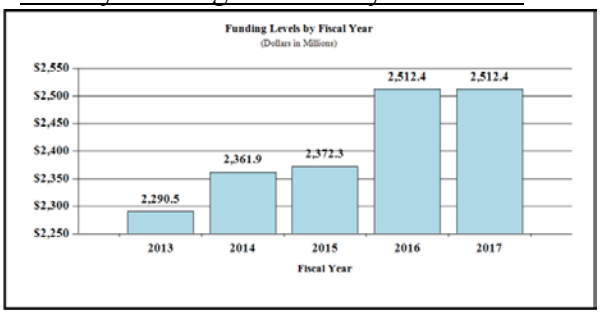
CHANGES	FY 2017 President's Budget[1] FTEs	FY 2017 President's Budget[1] Budget Authority	Change from FY 2016 FTEs	Change from FY 2016 Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2016 pay increase & benefits		$1,487		$7
b. January FY 2017 pay increase & benefits		1,487		25
c. Two less days of pay		1,487		-17
d. Differences attributable to change in FTE		1,487		-614
e. Payment for centrally furnished services		162		4
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		1,904		47
Subtotal				-$548
2. Research Management and Support:				
a. Annualization of January 2016 pay increase & benefits		$27,722		$89
b. January FY 2017 pay increase & benefits		27,722		329
c. Two less days of pay		27,722		-219
d. Differences attributable to change in FTE		27,722		-115
e. Payment for centrally furnished services		12,105		295
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		31,784		780
Subtotal				$1,159
Subtotal, Built-in				$611

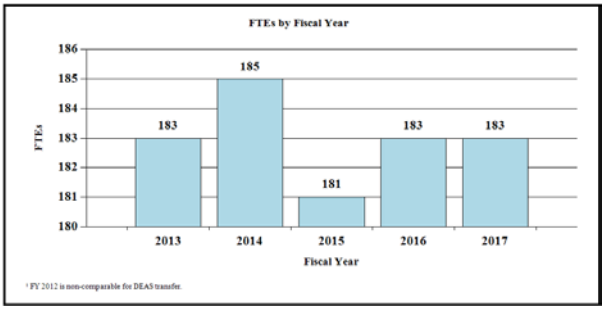
CHANGES	FY 2017 President's Budget[1] No.	FY 2017 President's Budget[1] Amount	Change from FY 2016 No.	Change from FY 2016 Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	2,925	$1,138,232	306	$127,235
b. Competing	913	364,598	-273	-109,247
c. SBIR/STTR	193	77,901	11	4,217
Subtotal, RPGs	4,031	$1,580,731	44	$22,205
2. Research Centers	203	$437,066	-8	-$20,316
3. Other Research	570	173,748	0	0
4. Research Training	4,199	215,532	0	0
5. Research and development contracts	25	30,196	2	-2,500
Subtotal, Extramural		$2,437,273		-$611
	FTEs		FTEs	
6. Intramural Research	0	$3,553	0	$0
7. Research Management and Support	183	71,611	0	0
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, Program	183	$2,512,437	0	-$611
Total changes				$0

[1] Includes mandatory financing.

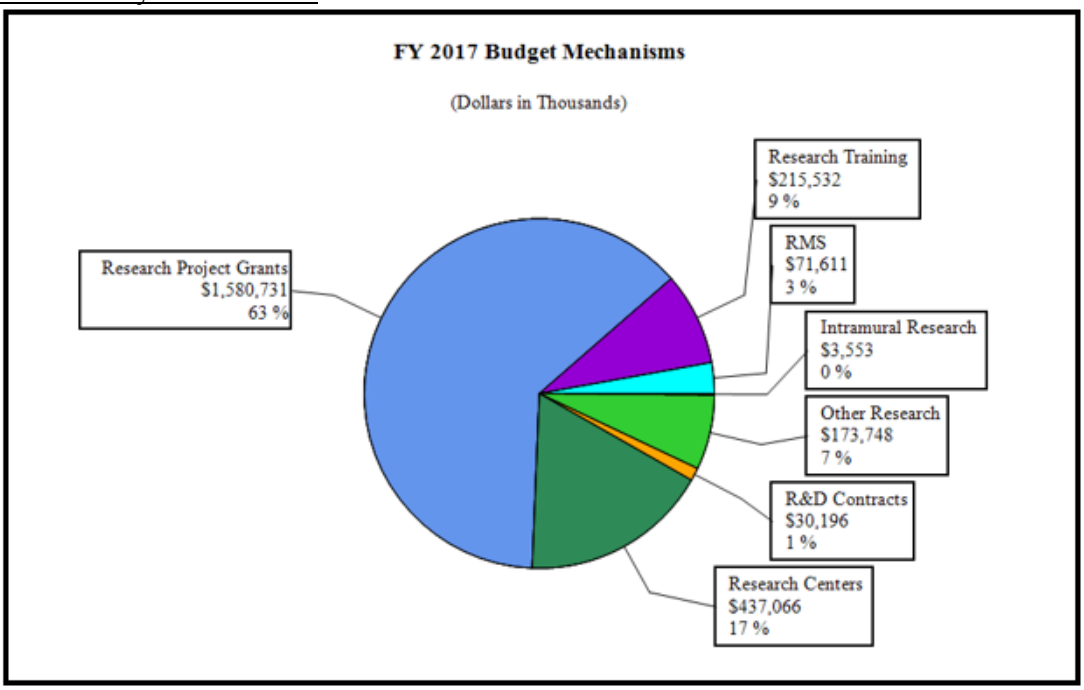
Fiscal Year 2017 Budget Graphs

History of Budget Authority and FTEs:

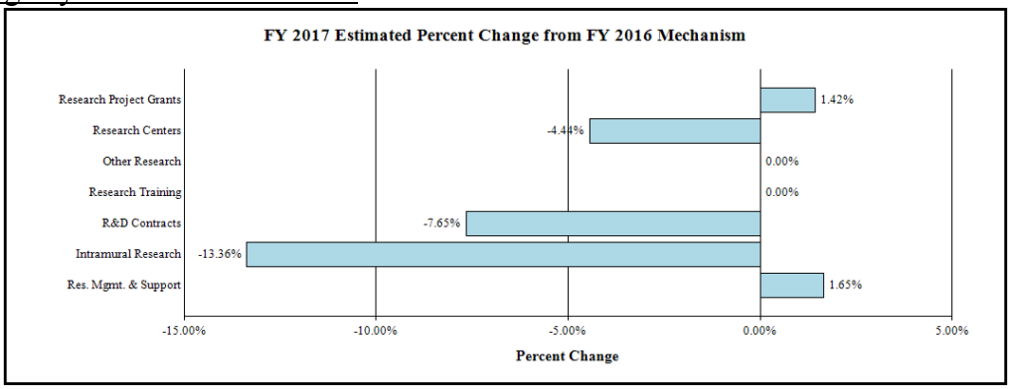




Distribution by Mechanism:



Change by Selected Mechanism:



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

	FY 2015 Actual		FY 2016 Enacted		FY 2017 President's Budget[2]		FY 2017 +/- FY2016	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Cell Biology and Biophysics		$508,455		$530,520		$530,387		-$133
Biomedical Technology, Bioinformatics and Computational		230,059		240,043		239,983		-60
Genetics and Developmental Biology		512,343		534,576		534,442		-134
Pharmacology, Physiology and Biological Chemistry		427,271		445,813		445,701		-112
Training, Workforce Development and Diversity		314,266		327,904		327,822		-82
Center for Research Capacity Building		309,904		359,028		358,938		-90
Institutional Development Award (IDeA)		*(273,325)*		*(320,840)*		*(320,840)*		*(0)*
Subtotal, Extramural		**$2,302,299**		**$2,437,884**		**$2,437,273**		**-$611**
Intramural Research	**5**	**$3,436**	**0**	**$4,101**	**0**	**$3,553**	**0**	**-$548**
Research Management & Support	**176**	**$66,567**	**183**	**$70,452**	**183**	**$71,611**	**0**	**$1,159**
TOTAL	**181**	**$2,372,301**	**183**	**$2,512,437**	**183**	**$2,512,437**	**0**	**$0**

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

NATIONAL INSTITUTES OF HEALTH
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Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2016 Amount Authorized	FY 2016 Enacted	2017 Amount Authorized	FY 2017 President's Budget[1]
Research and Investigation	Section 301	42§241	Indefinite	$1,732,437,000	Indefinite	$1,586,655,000
National Institute of General Medical Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$1,732,437,000		$1,586,655,000

[1]Excludes mandatory financing.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2007	$1,923,481,000	$1,923,481,000	$1,934,888,000	$1,935,618,000
Rescission				$0
2008	$1,941,462,000	$1,966,019,000	$1,978,601,000	$1,970,228,000
Rescission				$34,420,000
Supplemental				$10,296,000
2009	$1,937,690,000	$2,004,295,000	$1,991,609,000	$1,997,801,000
Rescission				$0
2010	$2,023,677,000	$2,069,156,000	$2,031,886,000	$2,051,798,000
Rescission				$0
2011	$2,125,090,000		$2,121,783,000	$2,051,798,000
Rescission				$18,016,009
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			

[1] 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 2015 Actual	FY 2016 Enacted	FY 2017 PB	FY 2017 + / - FY 2016
BA	$ 2,372,301,000	$2,512,437,000	$2,512,437,000	+$0
FTE	181	183	183	0

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

Director's Overview

Investing Strategically

The National Institute of General Medical Sciences (NIGMS) supports fundamental research that reveals how living systems work. As responsible stewards of taxpayer funds, NIGMS employs a data-driven process to improve efficiency, heighten scientific return on investment, and ensure fiscal accountability. As has been demonstrated time and again, it is never obvious where a breakthrough in biomedicine is going to come from, nor is it clear when it will happen or who will make the discovery. Again this year, for example, two long-time NIGMS grantees won Nobel prizes in Chemistry for their groundbreaking work (see Program Portrait "DNA Fix-It Process is Major Biomedical Discovery"). Such successes illustrate the basic ingredients for transforming discovery into health: diversity (of both science and scientists), time for creative thought and experimentation, high-quality resources that enable a human mind's ability to explore, and collaboration with others to extend the value of our investment in improving health.

Maximizing Research Potential

Just as in the business world, a diverse investment portfolio serves scientific discovery well. The NIGMS mission covers studies from atomic structures of proteins to population-level analyses of disease epidemics. NIGMS also distributes research dollars geographically across the United States, recognizing that the benefits of research discovery are often local and can grow regional economies in addition to improving health of particular populations. A good example is the NIGMS-supported Institutional Development Award (IDeA) program, which fosters health-related research and enhances the competitiveness of investigators at institutions located in states with historically low NIH funding. NIGMS' director recently visited West Virginia, an IDeA state, with Senator Shelly Moore Capito (R-WV) to meet with faculty and students from West Virginia University, Marshall University, and several small colleges in the region. Readily apparent was the dramatic impact of the NIH investment on students, researchers, and institutions, as well as how sharing of information and resources among partner institutions amplifies this investment. Common to all IDeA states, such cooperation and sharing creates

economies of scale that maximize access to powerful but expensive scientific instruments. NIGMS is developing strategies for national dissemination of best practices developed in the IDeA program to ensure that the public gets more science for the dollar.

Building the Research Workforce of Tomorrow Today

A key aspect of NIGMS' mission, as reflected in its new strategic plan, is building and sustaining a highly skilled, creative, and diverse research workforce, to create the Nobel laureates of tomorrow. NIGMS assesses its training programs routinely to see whether they are having the intended effect on developing talent amid massive shifts in information technology that make memorizing facts much less important than acquiring skills. One successful program is the Centers of Biomedical Research Excellence (COBRE) (see Program Portrait "Building Capacity"). The COBREs develop research skills of junior investigators and provide them with resources and opportunities for collaboration and mentoring needed to launch independent careers. A recent study of a COBRE faculty development program in Nevada showed that COBRE-funded junior investigators were three times more likely to have career success than a matched group of investigators who did not participate in the program.[1]

Applying Big Data and Technology to Improve Health

Researchers in NIGMS' computational biology and bioinformatics portfolio are working on problems ranging from how genes dictate whether a drug will work or have side effects for a particular individual to how microbiomes influence the functions of cells and organs. However, Big Data approaches are not merely useful for answering scientific questions; they can also contribute to an understanding and optimization of the scientific process itself. A recent paper by a group of scientists in California used data mining and network analysis of public databases to follow connections between basic research and major advances in medicine.[2] This "cure network informatics" approach used quantitative, analytical methods to trace medical advances back to the broad, diverse foundations on which those advances were built, including scientists in very different fields and very distant locations. This research provides an evidence base that emphasizes the importance of a central goal of NIGMS' strategic plan: maintaining a diverse portfolio of research, researchers, and institutions.

[1] von Bartheld CS, Houmanfar R, Candido A. Prediction of junior faculty success in biomedical research: comparison of metrics and effects of mentoring programs. *PeerJ*. 2015;3:e1262.

[2] Williams RS, Lotia S, Holloway AK, Pico AR. From Scientific Discovery to Cures: Bright Stars within a Galaxy. *Cell*. 2015 Sep 24;163(1):21-3.

Toward Precision Medicine: Understanding the Human Microbiome

Even within the same species, organisms are highly diverse – for example, our individual genomes and environment influence physical abilities or our propensity to get sick and to heal. One component of human diversity is the community of microorganisms that inhabit various locations in our bodies, such as our gut. There are a lot of them: microbial cells outnumber human cells. Instead of causing damage or infections, though, many members of our microbiome community actually provide protection from harm. A recent study at the University of Michigan concluded that part of the normal microbiome population in the intestines of mice prevented infection from the potentially lethal *Clostridium difficile* bacterium, which can thrive when hospital patients are given strong antibiotics to combat another bacterial infection.[3] The team identified certain microbiome samples that could withstand the antibiotic and also resist *Clostridium* infection. Moreover, they learned that a mix of gut bacteria was better than a homogeneous population in fighting infection, underscoring the value of biological diversity. Although the study was done in mice, the results could inform development of a diagnostic tool to predict which patients will need the most protection against *Clostridium* and offer them preventive treatments.

Program Descriptions and Accomplishments

Cell Biology and Biophysics (CBB): The CBB program fosters the study of cells and their components through physics- and chemistry-based technological approaches. Critical basic research supported by the program promotes the development of precise, targeted therapies as well as diagnostics for a range of diseases. In FY 2015, CBB continued support of the Regional Consortia for High-Resolution Cryoelectron Microscopy and plans are underway to re-announce this initiative in FY 2016. This program will provide access to state-of-the-art cryoelectron microscopy technology to a broad range of investigators. CBB also continues to support research that makes use of advanced techniques in cell biology, biophysics, cellular imaging, and structural biology to provide fundamental insights into biological processes. Since the Protein Structure Initiative: Biology program met its goals, in FY 2015 CBB shifted support in this scientific area to investigator-initiated studies.

Budget Policy:

The FY 2017 President's Budget request for the CBB program is $530.387 million, a decrease of $133 thousand or 0.03 percent compared to the FY 2016 Enacted level. The majority of CBB funds will be used to support investigator-initiated research projects in cell biology, biophysics, cellular imaging, and structural biology. In FY 2017, CBB will support current grantees to extend the scope of their studies of living systems to probe interactions among the large and diverse complexes that govern cell function. CBB will also use FY 2017 funds to support its AIDS-related structural biology projects.

Genetics and Developmental Biology (GDB): The GDB program promotes comprehensive study of the fundamental mechanisms of genetic, cellular, developmental, and evolutionary processes. This basic research provides a strong foundation for more disease-targeted projects

[3] Schubert AM, Sinani H, Schloss PD . Antibiotic-Induced Alterations of the Murine Gut Microbiota and Subsequent Effects on Colonization Resistance against *Clostridium difficile*. *MBio*. 2015;6(4):e00974.

that are supported by other NIH Institutes and Centers. To complement GDB's large investment in research that is performed in model organisms, GDB also will employ FY 2016 and FY 2017 funds to bolster human research studies both in individuals and in diverse populations. This research will be directed toward revealing the underpinnings of genetic components of human biology and human disease. GDB also continues to support research that reveals fundamental insights about the basic biology of stem cells that unravels the genetics and ecology underlying the interactions and dynamics of microbial communities normally associated with the human body and in model systems.

Budget Policy:
The FY 2017 President's Budget request for the GDB program is $534.442 million, a decrease of $134 thousand or 0.03 percent compared to the FY 2016 Enacted level. As with FY 2016, most of GDB expenditures will support individual investigators seeking fundamental knowledge about life processes. GDB will continue its support for collaborative research for molecular and genomic studies in animal models, as well as research into specific genetic variants within complex disorders. FY 2017 funds will also support research to explore interactions between hosts and microorganisms that make up the microbiota in humans and in model organisms. These relationships have a major impact on human health but remain poorly understood.

Program Portrait: DNA Fix-It Process is Major Biomedical Discovery
FY 2016 level: $29.6 million
FY 2017 level: $29.6 million
Change: $0 million

Arguably our most precious information, the DNA that makes up our genome is spooled tightly and packaged carefully into chromosomes inside our cells. This material provides the genetic instructions that help specify our growth and health and is copied every time a new cell is formed. Amid this frequent copying, or replication as the process is known, DNA is prone to nicks, cuts, and other types of damage, which can translate to problems in cell function. Although some of this damage comes from the environment, the DNA replication process is not perfect and makes plenty of errors itself that require fixing. Research on this fundamental life process common to nearly every cell on the planet won several NIGMS-funded scientists awards this past year and has led cancer researchers to develop useful drugs. The 2015 Nobel Prize in Chemistry went to three basic scientists for understanding details of this molecular patching process called DNA repair. The two awardees from the United States are long-time NIGMS grantees. Aziz Sancar, Ph.D., whose research has been funded continuously by NIGMS since 1982, described how cells respond to DNA injuries from UV radiation or chemicals like the carcinogens found in cigarette smoke. Paul Modrich, Ph.D., whose research has been funded continuously by NIGMS since 1975, detailed how cells address the copy errors in the genetic code that accumulate naturally during cell division. In addition, earlier this year, NIGMS grantee Stephen J. Elledge, Ph.D., shared the 2015 Albert Lasker Basic Medical Research Award ("the American Nobel") for his work on the DNA-damage response – a set of actions that cells undergo to protect their genomes against a nearly constant barrage of minor DNA damage. Collectively, this work is highly relevant to human health. For example, because tumor cells also have to rapidly repair their DNA as they divide, researchers have targeted elements of the repair process to cause cancerous cells to perish from their unrepaired genetic wounds. Already one marketed anticancer drug, olaparib, or Lynparza® (approved by the Food and Drug Administration in 2014) uses this approach, and many more are being tested in clinical trials. As evidence that more chapters in the story are being written, NIGMS grantee and young investigator Francesca Storici, Ph.D., recently introduced a new and potentially central player to the scene. Her paradigm-shifting research shows a surprising but important role for RNA, a DNA-like material that scientists are finding rivals DNA with its direct participation in a host of vital life processes, including DNA repair. Beyond providing a whole new avenue of study, Storici's work opens doors for potential new therapies for cancer or other conditions involving DNA repair.

Pharmacology, Physiology, and Biological Chemistry (PPBC): The PPBC program supports fundamental research in chemistry, biochemistry, pharmacology, and physiology that contributes to understanding human biology in health and disease and generates knowledge for new ways to diagnose and treat disease. In addition, PPBC funds research that explores clinical issues involving whole-body responses, including traumatic injury, burns, wound healing, sepsis, anesthesia, and clinical pharmacology. In FY 2015, PPBC awarded and assembled two initiatives: 1) The genomes-to-natural-products network, with the aims of producing tools and technologies to unleash the chemical diversity encoded in natural hosts such as fungi (e.g., for new antibiotics); and 2) The Pharmacogenomics Research Network, with the goals of producing research advances and providing leadership (e.g., development of the Clinical Pharmacogenetics Implementation Consortium (CPIC) guidelines) for the burgeoning field of personalized treatment in medicine.[4]

Budget Policy:
The FY 2017 President's Budget request for the PPBC program is $445.701 million, a decrease of $112 thousand or 0.03 percent compared to the FY 2016 Enacted level. In FY 2017, this program will continue to emphasize the support of investigator-initiated research grants related to basic physiology, pharmacology, and chemistry that inform knowledge of how small molecules influence human health. In FY 2017, the NIH Pharmacogenomics Research Network will continue promoting the goal of Precision Medicine using requested funds to support research on novel methods to identify and produce new potentially useful chemical entities using synthetic chemistry and synthetic biology.

Division of Biomedical Technology, Bioinformatics, and Computational Biology (BBCB): The BBCB program promotes integrated systems approaches for studying biological processes and supports the development of computational, mathematical, and statistical methods for advancing biomedical research. Examples include mechanistic and informatics studies of cellular processes, computational analyses of the relationships between therapeutic drugs and humans, and the quantitative modeling of the spread of infectious diseases. A major effort in BBCB is the Biomedical Technology Research Resources initiative that creates critical pioneering technologies and methods and applies these technologies to a broad range of basic, translational, and clinical research areas. These resources are used by thousands of NIH-supported scientists each year. In FY 2016, BBCB will introduce a new method for supporting currently funded synchrotron resources for structural biology that will provide greater stability of these resources for the broader biomedical community.

Budget Policy:
The FY 2017 President's Budget request for the BBCB program is $239.983 million, a decrease of $60 thousand or 0.03 percent compared to the FY 2016 Enacted level. As with all NIGMS programs, highest priority will go to investigator-initiated research that explores complex biological systems. Major initiatives employing FY 2017 funds include the Biomedical Technology Research Centers (BTRCs). In FY 2017, BBCB plans to fund investigator-initiated approaches to enable maximal usability of biomedical data and information.

[4] https://cpicpgx.org/

Division of Training, Workforce Development, and Diversity (TWD): The TWD program is responsible for training an outstanding and diverse biomedical workforce for the future. TWD supports training of Ph.D. and M.D.-Ph.D. students, as well as postdoctoral fellows – in basic, translational, and clinical research. TWD also supports student-development programs focused on enhancing diversity in undergraduate STEM training leading to research careers. TWD will continue its support for specialized programs in the biomedical sciences that recruit and train students from diverse backgrounds.

Budget Policy:
The FY 2017 President's Budget request for the TWD program is $327.822 million, a decrease of $82 thousand or 0.03 percent compared to the FY 2016 Enacted level. The budget includes funds and 2 percent stipend increases for the Ruth L. Kirschstein NRSA training program, which supported over 4,100 trainees in FY 2015. High priority will go to activities that promote diversity in the biomedical and behavioral research workforce.

Center for Research Capacity Building (CRCB): CRCB supports research, research training, faculty development, and research infrastructure improvement in states and institutions that have been historically underrepresented in NIH funding. CRCB administers three major programs: 1) The Institutional Development Award (IDeA) program broadens the geographic distribution of NIH funding for biomedical research in 23 states and Puerto Rico through four initiatives: development of thematic, multidisciplinary centers (COBRE), establishment of statewide networks for expanding research access and capabilities (INBRE), advancement of clinical and translational research that addresses regional health concerns (IDeA-CTR), and increasing the pool of NIH funded investigators (co-funding); 2) The Support of Competitive Research (SCORE) program seeks to increase the research competitiveness of faculty at institutions that have a historical mission focused on serving students from underrepresented groups; and 3) 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.

Budget Policy:
The FY 2017 President's Budget request for the CRCB program is $358.938 million, a decrease of $90 thousand or 0.03 percent compared to the FY 2016 Enacted level. In FY 2017, CRCB will continue to support new and continuing awards in these three programs as well as initiate small business and technology transfer activities in IDeA States.

Program Portrait: Building Research and Researchers: The COBRE Program

FY 2016 level:	$175.6 million
FY 2017 level:	$175.6 million
Change:	$0 million

As part of the NIGMS-supported IDeA program, the COBRE program supports thematic, multidisciplinary research centers in IDeA states – those states that are not major recipients of NIH funding. The COBREs – 113 nationwide – have enabled major new research endeavors in these states and have also been instrumental in building successful scientific careers for a large number of junior researchers. The National Academies of Science recently conducted an evaluation of programs designed to build research capacity in states that receive low levels of Federal funding and cited IDeA (and COBRE) as a model for all Federal agencies. Part of a nationwide network, COBRE programs are highly collaborative environments that blend cutting-edge research with career-development activities that

nurture the scientific leaders of tomorrow in 23 states and Puerto Rico. Notably, COBREs focus on developing talent and providing skills, as exemplified by the fact that nearly three-quarters of COBRE investigators go on to independent research careers. A significant component of this track record comes from facilitated mentoring programs that sustain our investment in young investigators and help keep the United States at the forefront of 21st century biomedical research. In addition, by providing extensive infrastructure and shared access to world-class instrumentation and facilities, the COBRE program not only stretches research dollars but also attracts high-caliber researchers to relatively underserved states, thus diversifying the scientific workforce geographically and promoting research on regional health concerns that otherwise would be understudied. COBREs also have a positive impact on local economies, which benefit from the presence and productivity of a research-intensive climate. A specific example is the COBRE at Mount Desert Island Biological Laboratory (MDIBL) in Maine, which supports junior investigator Voot Yin, Ph.D. Yin studies limb and organ regeneration, focusing on zebrafish, a species of animals that, unlike humans, can re-grow body parts (such as a severed tailfin or severely damaged heart). Although humans do not naturally re-grow severed limbs or seamlessly repair damaged organs, they do share the same genetic pathways that the zebrafish use to perform these feats, and Yin aims to find ways to activate those pathways in humans. Recently, he harnessed his understanding of the regeneration process in zebrafish to identify a naturally occurring molecule that accelerates regrowth of the fish's heart. Yin and MDIBL director Kevin Strange, Ph.D., co-founded a startup company, Novo Biosciences, earlier this year to pursue development of this healing molecule for potential use in humans. It is the first corporate spinoff in MDIBL's 115-year history.

Intramural: NIGMS has a small but unique intramural research training program, the NIGMS Postdoctoral Research Associate (PRAT) Program. PRAT postdoctoral research fellows (currently 27) 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 to genetics.

Budget Policy:
The FY 2017 President's Budget request for the Intramural Research program is $3.553 million, which is $548 thousand or 0.015 percent compared to the FY 2016 Enacted level. FY 2017 funds will provide training for outstanding postdoctoral fellows conducting research in emerging areas of science, while working in the intramural laboratories of other NIH Institutes or in the FDA. In FY 2017 the PRAT program will complete its transition to synchronizing the start of all three classes to the end of the fiscal year. This will result in a lower cost for the program in FY 2017, and limit the impact of the reduced funding level on the program. The PRAT program will continue to prioritize funding for fellows conducting research in quantitative/systems pharmacology and computational biology.

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. The program also encompasses strategic planning, coordination, and evaluation of NIGMS programs; regulatory compliance; and international coordination and liaison with other Federal agencies, Congress, and the public. RMS funds improvements in information technology tools to facilitate the peer-review process, to conduct portfolio analyses, and to assist with grants administration. In FY 2017, NIGMS will use RMS funds to consolidate its information technology infrastructure and relocate the associated hardware to an offsite location. Such activities comply with Federal Data Center Consolidation Initiative (FDCCI) efforts and will result in significant cost savings. RMS funds will also be used to update critical infrastructure platform components and support technologies.

Extending beyond technological improvements, NIGMS plans to enhance its public outreach through a redesigned website.

Budget Policy:
The FY 2017 President's Budget request for RMS is $71.611 million, an increase of $1.159 million or 1.65 percent above the FY 2016 Enacted level. The increase provides for the 1.6 percent pay increase across NIGMS and is reflected in RMS funds along with other support for the operational requirements of the Institute, including its necessary investments in information technology.

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Budget Authority by Object Class[1]
(Dollars in Thousands)

		FY 2016 Enacted	FY 2017 President's Budget[2]	FY 2017 +/- FY 2016
Total compensable workyears:				
	Full-time employment	183	183	0
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$0	$0	$0
	Average GM/GS grade	12.7	12.7	0.0
	Average GM/GS salary	$115	$117	$2
	Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	$0	$0	$0
	Average salary of ungraded positions	$150	$153	$2
	OBJECT CLASSES	**FY 2016 Enacted**	**FY 2017 President's Budget[2]**	**FY 2017 +/- FY 2016**
	Personnel Compensation			
11.1	Full-Time Permanent	$17,265	$17,397	$131
11.3	Other Than Full-Time Permanent	3,876	3,743	-133
11.5	Other Personnel Compensation	459	461	3
11.7	Military Personnel	0	0	0
11.8	Special Personnel Services Payments	1,342	910	-432
11.9	**Subtotal Personnel Compensation**	**$22,942**	**$22,511**	**-$431**
12.1	Civilian Personnel Benefits	$6,568	$6,699	$130
12.2	Military Personnel Benefits	0	0	0
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$29,510**	**$29,209**	**-$301**
21.0	Travel & Transportation of Persons	$564	$574	$10
22.0	Transportation of Things	2	2	0
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Others	3	3	0
23.3	Communications, Utilities & Misc. Charges	287	292	5
24.0	Printing & Reproduction	0	0	0
25.1	Consulting Services	$517	$526	$9
25.2	Other Services	9,427	9,597	169
25.3	Purchase of goods and services from government accounts	95,279	97,056	1,777
25.4	Operation & Maintenance of Facilities	$159	$162	$3
25.5	R&D Contracts	3,681	3,747	66
25.6	Medical Care	0	0	0
25.7	Operation & Maintenance of Equipment	2,265	2,306	41
25.8	Subsistence & Support of Persons	0	0	0
25.0	**Subtotal Other Contractual Services**	**$111,329**	**$113,394**	**$2,066**
26.0	Supplies & Materials	$58	$59	$1
31.0	Equipment	685	698	12
32.0	Land and Structures	0	0	0
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	1,589,999	1,520,716	-69,282
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	**$1,702,927**	**$1,635,739**	**-$67,188**
	Total Budget Authority by Object Class	**$1,732,437**	**$1,664,948**	**-$67,489**

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

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Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2016 Enacted	FY 2017 President's Budget	FY 2017 +/- FY 2016
Personnel Compensation			
Full-Time Permanent (11.1)	$17,265	$17,397	$131
Other Than Full-Time Permanent (11.3)	3,876	3,743	-133
Other Personnel Compensation (11.5)	459	461	3
Military Personnel (11.7)	0	0	0
Special Personnel Services Payments (11.8)	1,342	910	-432
Subtotal Personnel Compensation (11.9)	**$22,942**	**$22,511**	**-$431**
Civilian Personnel Benefits (12.1)	$6,568	$6,699	$130
Military Personnel Benefits (12.2)	0	0	0
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$29,510**	**$29,209**	**-$301**
Travel & Transportation of Persons (21.0)	$564	$574	$10
Transportation of Things (22.0)	2	2	0
Rental Payments to Others (23.2)	3	3	0
Communications, Utilities & Misc. Charges (23.3)	287	292	5
Printing & Reproduction (24.0)	0	0	0
Other Contractual Services:			
Consultant Services (25.1)	517	526	9
Other Services (25.2)	9,427	9,597	169
Purchases from government accounts (25.3)	38,353	39,106	753
Operation & Maintenance of Facilities (25.4)	159	162	3
Operation & Maintenance of Equipment (25.7)	2,265	2,306	41
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$50,721**	**$51,697**	**$976**
Supplies & Materials (26.0)	$58	$59	$1
Subtotal Non-Pay Costs	**$51,635**	**$52,627**	**$992**
Total Administrative Costs	**$81,145**	**$81,836**	**$691**

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Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2015 Actual			FY 2016 Est.			FY 2017 Est.		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Center for Research Capacity Building									
Direct:	3		3	3		3	3		3
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	3		3	3		3	3		3
Division of Biomedical Technology, Bioinformatics, and Computational Biology									
Direct:	12	-	12	12	-	12	12	-	12
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	12	-	12	12	-	12	12	-	12
Division of Cell Biology and Biophysics									
Direct:	15	-	15	15	-	15	15	-	15
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	15	-	15	15	-	15	15	-	15
Division of Genetic and Developmental Biology									
Direct:	13	-	13	13	-	13	13	-	13
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	13	-	13	13	-	13	13	-	13
Division of Pharmacology, Physiology, and Biological Chemistry									
Direct:	14	-	14	14	-	14	14	-	14
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	14	-	14	14	-	14	14	-	14
Division of Training, Workforce Development, and Diversity									
Direct:	21	-	21	21	-	21	21	-	21
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	21	-	21	21	-	21	21	-	21
Office of Administrative Management									
Direct:	24	-	24	24	-	24	24	-	24
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	24	-	24	24	-	24	24	-	24
Office of Extramural Activities									
Direct:	48	-	48	49	-	49	49	-	49
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	48	-	48	49	-	49	49	-	49
Office of Scientific Review									
Direct:	16	-	16	16	-	16	16	-	16
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	16	-	16	16	-	16	16	-	16
Office of the Director									
Direct:	15	-	15	16	-	16	16	-	16
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	15	-	15	16	-	16	16	-	16
Total	181	-	181	183	-	183	183	-	183
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
2013	13.2
2014	13.2
2015	12.7
2016	12.7
2017	12.7

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Detail of Positions[1]

GRADE	FY 2015 Actual	FY 2016 Enacted	FY 2017 President's Budget
Total, ES Positions	0	0	0
Total, ES Salary	0	0	0
GM/GS-15	22	22	22
GM/GS-14	62	64	64
GM/GS-13	43	43	43
GS-12	8	8	8
GS-11	7	7	7
GS-10	0	0	0
GS-9	3	3	3
GS-8	5	5	5
GS-7	15	15	15
GS-6	1	1	1
GS-5	0	0	0
GS-4	0	0	0
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	166	168	168
Grades established by Act of July 1, 1944 (42 U.S.C. 207)	0	0	0
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	26	21	21
Total permanent positions	166	168	168
Total positions, end of year	192	189	189
Total full-time equivalent (FTE) employment, end of year	181	183	183
Average ES salary	0	0	0
Average GM/GS grade	12.7	12.7	12.7
Average GM/GS salary	113,002	114,955	116,714

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