

DEPARTMENT OF HEALTH AND HUMAN SERVICES

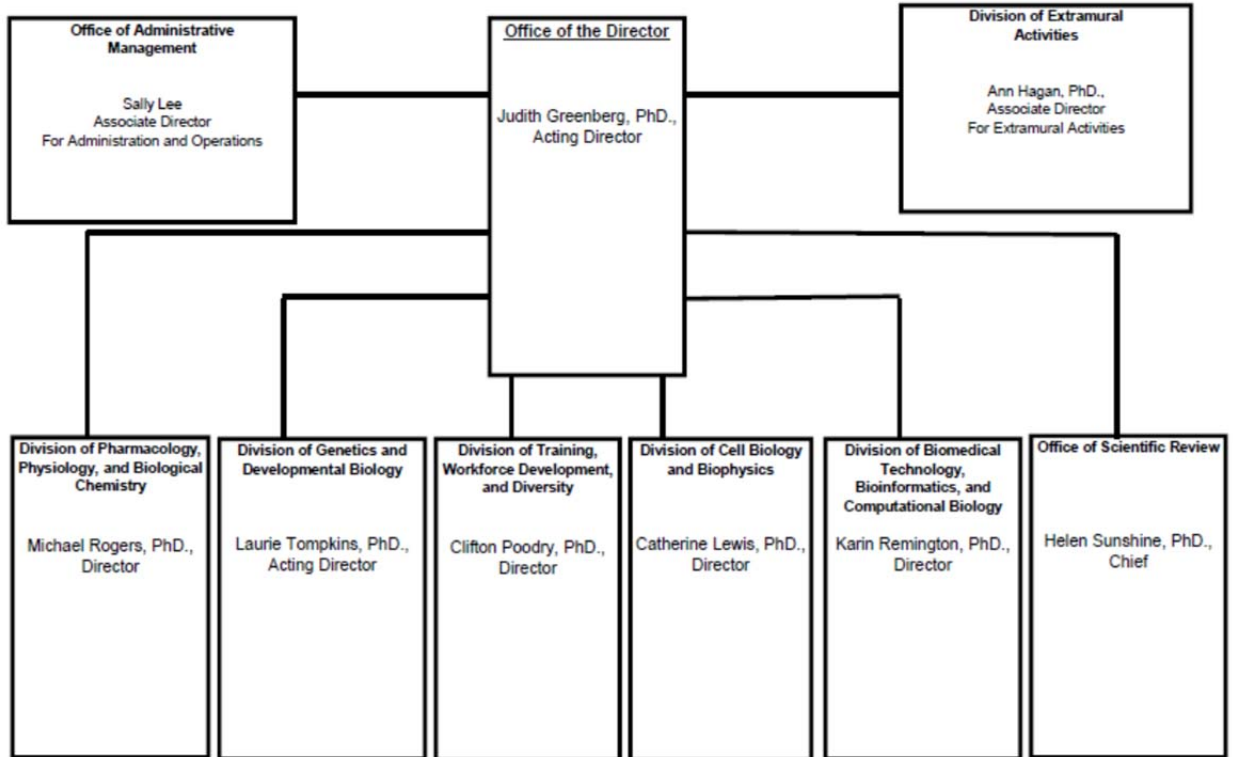
NATIONAL INSTITUTES OF HEALTH

National Institute of General Medical Sciences (NIGMS)

<u>FY 2013 Budget</u>	<u>Page No.</u>
Organization Chart.....	2
Appropriation Language.....	3
Amounts Available for Obligation.....	4
Budget Mechanism Table.....	5
Major Changes in Budget Request.....	6
Summary of Changes.....	7
Budget Graphs.....	9
Budget Authority by Activity.....	10
Authorizing Legislation.....	11
Appropriations History.....	12
Justification of Budget Request.....	13
Budget Authority by Object Class.....	21
Salaries and Expenses.....	22
Detail of Full-Time Equivalent Employment (FTE).....	23
Detail of Positions.....	24

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 Public Health Services Act with respect to general medical sciences [\$2,434,637,000: *Provided*, That not less than \$276,480,000 is provided for the Institutional Development Awards program] \$2,378,835,000. (*Department of Health and Human Services Appropriations Act, 2012.*)

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

**Amounts Available for Obligation <sup>1</sup>**  
(Dollars in Thousands)

<b>Source of Funding</b>	<b>FY 2011 Actual</b>	<b>FY 2012 Enacted</b>	<b>FY 2013 PB</b>
Appropriation	2,051,798	2,434,637	2,378,835
Type 1 Diabetes	0	0	0
Rescission	(18,016)	(4,601)	0
Supplemental	0	0	0
Subtotal, adjusted appropriation	2,033,782	2,430,036	2,378,835
Real transfer under Secretary's transfer authority	0	(692)	0
Comparative Transfers for NCATS reorganization	338,129	0	0
Comparative Transfers to NCATS for Therapeutics and Rare and Neglected Diseases (TRND)	(1,674)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(1,745)	(2,155)	0
Subtotal, adjusted budget authority	2,368,492	2,427,189	2,378,835
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	2,368,492	2,427,189	2,378,835
Unobligated balance lapsing	(135)	0	0
Total obligations	2,368,357	2,427,189	2,378,835

<sup>1</sup> Excludes the following amounts for reimbursable activities carried out by this account:  
FY 2011 - \$1,094    FY 2012 - \$5,307    FY 2013 - \$5,307

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**  
**Budget Mechanism - Total <sup>1/</sup>**  
(Dollars in Thousands)

MECHANISM	FY 2011 Actual		FY 2012 Enacted		FY 2013 PB		Change vs. FY 2012	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants								
<u>Research Projects</u>								
Noncompeting	2,783	\$1,023,551	2,787	\$1,039,868	2,788	\$1,043,347	1	\$3,479
Administrative Supplements	<i>166</i>	<i>12,898</i>	<i>166</i>	<i>12,898</i>	<i>160</i>	<i>12,398</i>	(6)	(500)
Competing:								
Renewal	466	178,705	449	171,225	449	169,486	0	(1,739)
New	486	169,049	508	178,197	503	174,559	(5)	(3,638)
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	952	\$347,754	957	\$349,422	952	\$344,045	(5)	(\$5,377)
Subtotal, RPGs	3,735	\$1,384,203	3,744	\$1,402,188	3,740	\$1,399,790	(4)	(\$2,398)
SBIR/STTR	151	\$60,961	155	\$62,624	157	\$63,358	2	\$734
Research Project Grants	3,886	\$1,445,164	3,899	\$1,464,812	3,897	\$1,463,148	(2)	(\$1,664)
<u>Research Centers</u>								
Specialized/Comprehensive	148	\$389,346	165	\$426,320	141	\$372,793	(24)	(\$53,527)
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	35	62,513	35	61,524	35	60,293	0	(1,231)
Comparative Medicine	0	315	0	323	0	317	0	(6)
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	183	\$452,174	200	\$488,167	176	\$433,403	(24)	(\$54,764)
<u>Other Research</u>								
Research Careers	93	\$21,859	99	\$23,359	97	\$22,892	(2)	(\$467)
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	0	0	0	0	0	0	0	0
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	349	100,165	354	104,905	347	102,807	(7)	(2,098)
Other	151	39,433	152	39,733	149	38,938	(3)	(795)
Other Research	593	\$161,457	605	\$167,997	593	\$164,637	(12)	(\$3,360)
Total Research Grants	4,662	\$2,058,795	4,704	\$2,120,976	4,666	\$2,061,188	(38)	(\$59,788)
<u>Research Training</u>								
Individual Awards	<u>FTTPs</u> 422	\$19,483	<u>FTTPs</u> 422	\$19,799	<u>FTTPs</u> 407	\$19,403	(15)	(\$396)
Institutional Awards	3,888	179,250	3,888	180,882	3,775	177,264	(113)	(3,618)
Total Research Training	4,310	\$198,733	4,310	\$200,681	4,182	\$196,667	(128)	(\$4,014)
Research & Development Contracts	34	\$42,830	34	\$37,398	34	\$52,985	0	\$15,587
<i>SBIR/STTR</i>	<i>1</i>	<i>222</i>	<i>1</i>	<i>\$222</i>	<i>1</i>	<i>\$222</i>	<i>0</i>	<i>\$0</i>
Intramural Research	<u>FTEs</u> 11	\$2,774	<u>FTEs</u> 11	\$2,816	<u>FTEs</u> 11	\$2,793	<u>FTEs</u> 0	(\$23)
Research Management and Support	154	65,360	154	65,318	152	65,202	(2)	(116)
Construction	0	0	0	0	0	0	0	0
Buildings and Facilities	0	0	0	0	0	0	0	0
Total, NIGMS	165	\$2,368,492	165	\$2,427,189	163	\$2,378,835	(2)	(\$48,354)

1/ All items in italics are "non-adds"; items in parenthesis are subtractions.

## **Major Changes in the Fiscal Year 2013 President's 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 2013 President's Budget request for NIGMS, which is \$48.354 million less than the FY 2012 Enacted level, for a total of \$2,378.835 million.

Research Centers (-\$54.764 million; total \$433.403 million): In FY 2013, NIGMS will continue to maintain its center grant portfolio that comprises centers in systems biology, biomedical technology, structural biology, trauma and burn, as well as the Institutional Development Awards (IDeA) program. The Budget includes \$225.438 million for IDeA in FY 2013, \$50.519 million below the FY 2012 level, to focus the Institute's resources on other research priorities. .

Research and Development (R&D) Contracts (+\$15.587 million; total \$52.985 million): In FY 2013, NIGMS will continue to support the development of a state-of-the-art National Synchrotron Light Source-II (NSLS-II) at the Brookhaven National Laboratory. Synchrotron radiation is a critical tool for biomedical researchers and will support the research of investigators from at least 20 NIH institutes and centers. A portion of the R&D Contract budget will support the NIH Basic and Behavioral and Social Sciences Research Opportunity Network (OppNet).

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**  
**Summary of Changes**  
(Dollars in Thousands)

<b>FY 2012 Enacted</b>				<b>\$2,427,189</b>
<b>FY 2013 President's Budget</b>				<b>\$2,378,835</b>
<b>Net change</b>				<b>(\$48,354)</b>
<b>CHANGES</b>	<b>2013 Estimate</b>		<b>Change from FY 2012</b>	
	<b>FTEs</b>	<b>Budget Authority</b>	<b>FTEs</b>	<b>Budget Authority</b>
A. Built-in:				
1. Intramural Research:				
a. Annualization of January				
2012 pay increase & benefits		\$1,382		\$0
b. January FY 2013 pay increase & benefits		1,382		4
c. One more day of pay		1,382		5
d. Annualization of PY net hires		1,382		0
e. Payment for centrally furnished services		154		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		1,257		0
Subtotal				\$9
2. Research Management and Support:				
a. Annualization of January				
2012 pay increase & benefits		\$22,832		\$0
b. January FY 2013 pay increase & benefits		22,832		68
c. One more day of pay		22,832		88
d. Annualization of PY net hires		22,832		0
e. Payment for centrally furnished services		11,383		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		30,987		0
Subtotal				\$156
Subtotal, Built-in				\$165

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

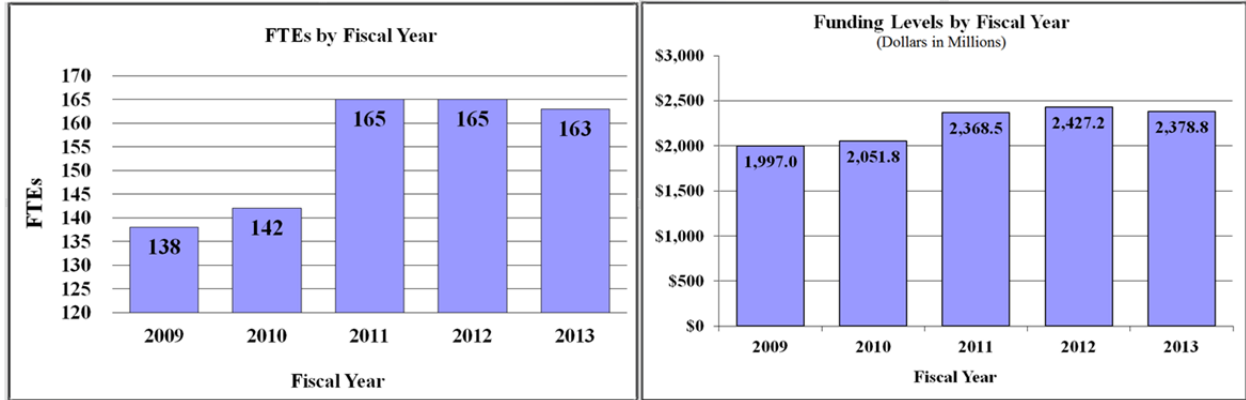
**Summary of Changes--continued**

CHANGES	2013 President's Budget		Change from FY 2012	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	2,788	\$1,055,745	1	\$2,979
b. Competing	952	344,045	(5)	(5,377)
c. SBIR/STTR	157	63,358	2	734
Total	3,897	\$1,463,148	(2)	(\$1,664)
2. Research Centers	176	\$433,403	(24)	(\$54,764)
3. Other Research	593	164,637	(12)	(3,360)
4. Research Training	4,182	196,667	(128)	(4,014)
5. Research and development contracts	34	52,985	0	15,587
Subtotal, Extramural		\$2,310,840		(\$48,215)
6. Intramural Research	<u>FTEs</u> 11	\$2,793	<u>FTEs</u> 0	(\$32)
7. Research Management and Support	152	65,202	(2)	(272)
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program	163	\$2,378,835	(2)	(\$48,519)
Total changes				(\$48,354)

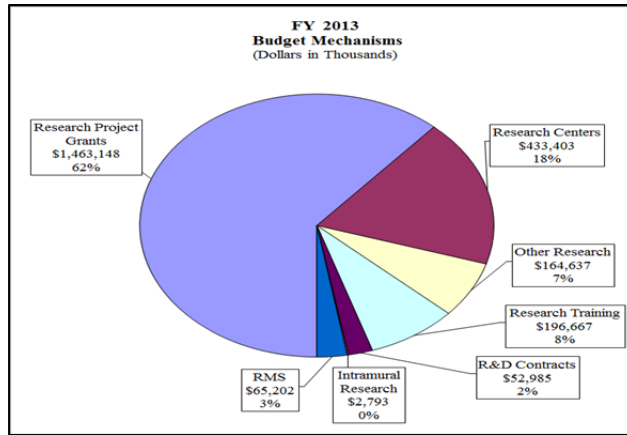


## Fiscal Year 2013 Budget Graphs

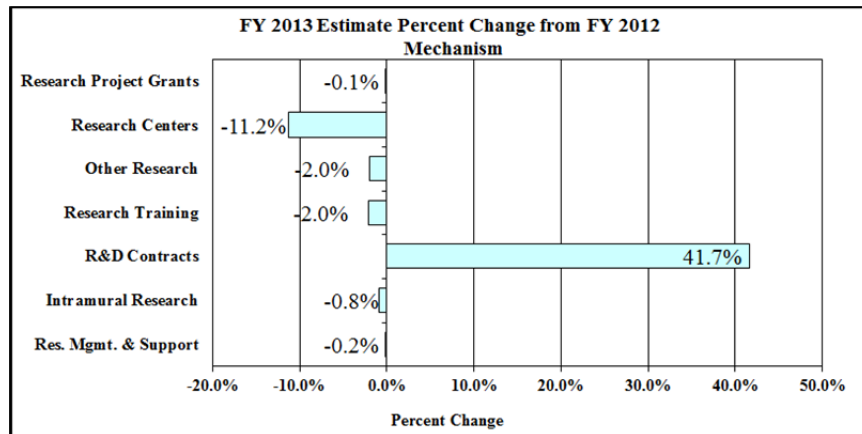
### History of Budget Authority and FTEs:



### Distribution by Mechanism:



### Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH  
National Institute of General Medical Sciences  
Budget Authority by Activity  
(Dollars in Thousands)

	FY 2011 Actual		FY 2012 Enacted		FY 2013 PB		Change vs. FY 2012 Enacted	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
<b>Extramural Research</b>								
<u>Detail:</u>								
Cell Biology and Biophysics		\$568,199		\$569,313		\$569,902		\$589
Biomedical Technology, Bioinformatics and Computational Biology		246,109		252,540		252,802		262
Genetics and Developmental Biology		523,090		515,878		516,413		535
Pharmacology, Physiology and Biological Biological Chemistry		379,983		384,907		385,306		399
Training, Workforce Development and Diversity		582,977		636,417		586,417		(50,000)
<i>Institutional Development Award (IDeA) (non-add)</i>		\$226,505		\$275,957		\$225,438		(50,519)
<b>Subtotal, Extramural</b>		\$2,300,358		\$2,359,055		\$2,310,840		(\$48,215)
<b>Intramural Research</b>	11	\$2,774	11	\$2,816	11	\$2,793	0	(\$23)
<b>Research Management &amp; Support</b>	154	\$65,360	154	\$65,318	152	\$65,202	(2)	(\$116)
<b>TOTAL</b>	165	\$2,368,492	165	\$2,427,189	163	\$2,378,835	(2)	(\$48,354)

1. Includes FTEs which are reimbursed from the NIH Common Fund.

2. Includes Real Transfers and Comparable Adjustments as detailed in the "Amounts Available for Obligation" table.

**NATIONAL INSTITUTES OF HEALTH  
National Institute of General Medical Sciences**

**Authorizing Legislation**

	<b>PHS Act/ Other Citation</b>	<b>U.S. Code Citation</b>	<b>2012 Amount Authorized</b>	<b>FY 2012 Enacted</b>	<b>2013 Amount Authorized</b>	<b>FY 2013 PB</b>
Research and Investigation	Section 301	42§241	Indefinite	\$2,427,189,000	Indefinite	\$2,378,835,000
National Institute of General Medical Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
<b>Total, Budget Authority</b>				<b>\$2,427,189,000</b>		<b>\$2,378,835,000</b>

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

**Appropriations History**

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2004	\$1,923,133,000	\$1,923,133,000	\$1,917,033,000	\$1,916,333,000
Rescission				(\$11,495,000)
2005	\$1,959,810,000	\$1,959,810,000	\$1,975,500,000	\$1,959,810,000
Rescission				(\$15,743,000)
2006	\$1,955,170,000	\$1,955,170,000	\$2,002,622,000	\$1,955,170,000
Rescission				(\$19,552,000)
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			

## Justification of Budget Request

### *National Institute for General Medical Sciences*

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

Budget Authority (BA):

	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Budget	FY 2013 + / - FY 2012
BA	\$2,368,492,000	\$2,427,189,000	\$2,378,835,000	-\$48,354,000
FTE	165	165	163	-2

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

### **Director's Overview**

In 2012, the National Institute of General Medical Sciences (NIGMS) achieved a momentous feat, turning 50. While the Institute has much to celebrate, it has never been more committed to serving its role as NIH's "basic research institute." NIGMS plans to maintain its time-tested strategy of long-term, stable research support for highly creative scientists committed to building a broad and deep foundation of discovery. Through NIGMS-funded research, the spark of individual bright minds produces knowledge and therapies that are saving the lives of people in every corner of America every day.

### **Investing in Basic Research**

A crucial outcome of basic research is knowledge--today's currency of global competitiveness. NIGMS-funded researchers working in various areas of science have shattered paradigms about what we thought we knew about basic molecules and cells, and this information has expanded our understanding with regard to health and disease. For example, natural sugar molecules (glycans) are critical for defining cell and organ function, but much about these key molecules remains a mystery (see Program Portrait, page 18). We also know that RNA, DNA's molecular cousin, plays a starring--not simply a supporting--role in a wide range of biological functions. Clarifying the structure and function of glycans and RNA remains a priority for NIGMS research support, as scientists continue to explore the activities of these basic ingredients of our cells in cancer, development, infections, and other health-related processes.

Animal models of disease--laboratory mice in particular--are valuable tools for biomedical discovery. However, researchers have recently confirmed laboratory mice do not represent the diversity of either wild mice or humans, because they are bred from a very small gene pool. This limits the ability of scientists to connect mouse-related findings to human health. NIGMS is supporting the Collaborative Cross, a research effort that aims to vastly increase the diversity of mouse data available for study. The project has generated an online database of mouse genetic

variation that represents approximately four times the genetic variation of the world's human populations and is poised to facilitate research more applicable to human diseases.

### **Accelerating Discovery Through Technology**

Created in 2000, the Protein Structure Initiative (PSI) is a federal, university, and industry effort aimed at dramatically reducing the costs and lessening the time it takes to determine a three-dimensional protein structure. The PSI remains a highly successful NIGMS program that has accelerated discovery through technology. Its most recent iteration, PSI:Biology, began in 2010 to harvest the fruits of earlier methods-based development work to address significant problems in biomedicine. A key component of PSI:Biology is a publicly accessible repository that provides PSI-generated biological resources to researchers everywhere, significantly catalyzing discovery in various areas of health and disease. The Biomedical Technology Research Centers are another example of the synergistic interaction of technical and biomedical expertise. These Centers promote the widespread and routine application of cutting-edge imaging and computer-based technologies across the full spectrum from bench to bedside.

NIGMS continues to invest in computer modeling approaches for various health-related applications, such as understanding and preventing disease outbreaks. In recent work, scientists with the Models of Infectious Disease Agent Study (MIDAS) investigated the cholera outbreak that occurred after the earthquake in Haiti. The models revealed that, had a large stockpile of oral cholera vaccine been available, and given to the Haitians most at risk after the earthquake, cholera-induced illness and death could have been slashed by about half. As this study clearly demonstrates, MIDAS research findings continue to have significant policy implications for managing public health crises that can emerge without warning.

### **Advancing Translational Sciences**

Developing a single new medicine from concept to consumer is an extremely costly and time-consuming process—often taking more than a decade and up to \$1 billion. Approaches that can save time and costs could accelerate this process. In recent work, NIGMS-funded scientists searched through public databases of medical research information to see how 100 diseases affected the activity of thousands of genes. This enabled them to develop various genetic “signatures” that they subsequently matched to approved drugs that were known to affect the same genes. This study suggested that an epilepsy drug may work better than existing treatments for inflammatory bowel disease, and an anti-ulcer medication might be useful for lung cancer treatment. While the computer results were confirmed in animal studies, further analyses will require testing in humans.

In another example of advancing basic science toward patient care, a group of scientists created a family-wide genetic risk report. Their findings, which build on a 2010 study<sup>1</sup> that reported the first whole-genome medical risk assessment for an individual, uncovered an inherited tendency for blood clots. The new information enables family members to pursue lifestyle changes and medications to prevent future illness. This essential proof-of-principle study lays important groundwork for future studies that will enable disease risk prediction more broadly.

---

<sup>1</sup> Ashley EA, Butte AJ, Wheeler MT, Chen R, et al. Clinical assessment incorporating a personal genome. *Lancet*. 2010;375:1525-35.

### **Encouraging New Investigators and New Ideas**

In April 2011, NIGMS issued *Investing in the Future*, a strategic plan for its biomedical and behavioral research training programs. In implementing the plan, NIGMS strongly encourages high-quality mentorship and recognizes the diversity of successful careers open to well-trained scientists. The Institute has recently established a new organizational component, the Division of Training, Workforce Development, and Diversity, which integrates training and diversity activities across Institute programs and oversees the Institutional Development Award (IDeA) program that broadens the geographic distribution of NIH funding.

Overall Budget Policy: The FY 2013 President's Budget request for NIGMS is \$2,378.835 million, a decrease of \$48.354 million or -1.99 percent under the FY 2012 Enacted level.

Developing a strong scientific workforce is a core element of the NIGMS mission. Because the Institute's highest priorities are investigator-initiated research projects, including those conducted by early-career investigators, in FY 2012 and FY 2013, NIGMS will continue to support new investigators and maintain an adequate number of competing research project grants.

NIGMS also supports the IDeA program to broaden the geographic distribution of NIH funding for biomedical and behavioral research. This effort increases the competitiveness of investigators at institutions underrepresented in NIH funding in 23 states and Puerto Rico. IDeA grants support faculty development and research infrastructure enhancements at those institutions.

In addition to its research funding activities, NIGMS supports biomedical research workforce development through a range of research training programs. In FY 2013, NIGMS will provide an across-the-board increase of 2.0 percent in stipend levels under the Ruth L. Kirschstein National Research Service Award (NRSA) training program, in line with recommendations from the National Academy of Sciences to attain stipend levels that sustain the development of a highly qualified biomedical research workforce.

Intramural Research and Research Management and Support (RMS) programs will receive a modest decrease to promote spending efficiency.

Funds are included in R&D contracts to support trans-NIH initiatives, such as the Basic Behavioral and Social Sciences Opportunity Network (OppNet) and support for a new synchrotron at the Brookhaven National Laboratory

### **Program Description and Accomplishments**

**Cell Biology and Biophysics (CBB):** The CBB program fosters the study of cells and their components. Physics- and chemistry-based technological advances, driven by new types of microscopy, structural biology tools, and other novel imaging techniques have deepened understanding of life at the level of molecules and atoms. Critical basic research supported by the CBB program promotes the development of precise, targeted therapies, as well as diagnostics for a range of diseases. In FY 2011, the program continued with the third phase of the Protein

Structure Initiative (PSI), PSI:Biography, which makes powerful protein structure resources available to the broad scientific community. PSI:Biography is expected to continue through FY 2015. Also in FY 2011, CBB announced its intent to continue support of the AIDS-Related Structural Biology Program.

**Budget Policy:** The FY 2013 President's Budget request for the CBB program is \$569.902 million, an increase of \$589 thousand or 0.10 percent over the FY 2012 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 2013, CBB will support research to develop new information about RNA structure and its role in gene regulation. This research has the potential to lay the groundwork for the development of targeted diagnostics and therapeutics. CBB will also use FY 2013 funds to support programs in single-molecule technologies as well as for an AIDS-related structural biology program.

**Program Portrait: AIDS-Related Structural Biology Program**

FY 2012 level: \$42,788,727  
FY 2013 level: \$42,385,790  
Change: -\$402,937

For 25 years, NIGMS has supported basic research on the physical and functional properties of the human immunodeficiency virus (HIV) by funding a variety of types of research and research training grants. The AIDS-Related Structural Biology Program began in 1987, six years after AIDS was first recognized as a serious health issue. At that time, NIGMS began funding research that combined techniques from physics and biology toward the "rational," or structure-based, design of medicines to treat this deadly disease. That initial funding, administered to teams of researchers at universities and at biotechnology companies, was instrumental in the development of antiretroviral drug therapies called HIV protease inhibitors. Other researchers built upon those key findings to develop so-called triple-combination, or highly-active antiretroviral therapy, a life-saving treatment regimen that has dramatically changed the face of HIV/AIDS from a death sentence to a chronically manageable condition. Today, the NIGMS AIDS-Related Structural Biology Program continues to shed light on a broad range of basic scientific questions about this unique virus and its life cycle. In 2008, NIGMS reorganized and refocused its efforts in this area around centers (three of which are currently funded) that study viral-host interactions as targets for drug therapy. The rationale for targeting host factors or their complexes with components of HIV is that elements of the host cell are not subject to the rapid evolution that the virus undergoes and thus represent more stable targets for drug development. It is a formidable frontier, and one unlikely to be explored by industry due to the inherent risks. Thus, at this juncture, NIGMS is supporting challenging AIDS-related structural biology research, with the hope of informing the development of "mechanism-based drug design." Already, in the first few years of funding, NIGMS-funded scientists working in the new centers have identified potential new vulnerabilities in HIV's ability to infect and cause disease. Particularly promising findings include the researchers' construction of a comprehensive "interactome" map of HIV and 435 different ways it interacts with human cells. This new data present a wealth of opportunities for follow-on structural analysis and that may lead to new drugs.



**Genetics and Developmental Biology (GDB):** The GDB program promotes basic research on fundamental mechanisms of inheritance and development. This research provides a strong foundation for more targeted projects supported by other NIH components. Although much of GDB's investigator-initiated research is performed in model organisms, GDB also plans to expand its support for human research that applies systematic approaches to better understand health and disease. A workshop on this topic was convened in FY 2011, which led to a call for research grant applications for funding in FY 2013. Also in FY 2011, GDB continued to support research on the basic biology of stem cells by supporting eight program project grants, including three new ones focused on the fundamental biology of pluripotency and genetic reprogramming of induced pluripotent stem cells.

Budget Policy: The FY 2013 President's Budget request for the GDB program is \$516.413 million, an increase of \$535 thousand or 0.10 percent over the FY 2012 Enacted level. As with FY 2012, most GDB expenditures will support individual investigators seeking fundamental knowledge about life processes. In FY 2013, 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. NIGMS expects that this investment will enhance the practice of clinical genetics.

**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. The program also funds research that explores clinical issues involving whole-body responses in important public health areas such as traumatic injury, burns, wound healing, sepsis, and anesthesia. In FY 2011 and continuing through FY 2012, PPBC launched a trans-NIH, interagency collaboration in glycomics—the study of biological sugars, or glycans, often referred to as biology's "third molecular language" beyond that of genes and proteins (see Program Portrait, page 18). In FY 2011, four postdoctoral fellows in PPBC's Pharmacology Research Program won honors for their work from national societies; this program provides support for NIH intramural fellows who wish to receive advanced training in pharmacology and related sciences.

Budget Policy: The FY 2013 President's Budget request for the PPBC program is \$385.306 million, an increase of \$399 thousand or 0.10 percent over the FY 2012 Enacted level. In FY 2012, PPBC will continue to emphasize the support of investigator-initiated research grants related to basic physiology, pharmacology, and chemistry that inform the foundation of knowledge in biomedicine. In FY 2013, the Pharmacogenetics Research Network will continue working toward promoting the goal of personalized medicine. PPBC-supported research on the structure and function of natural sugars called glycans is expected to have a major impact on numerous ongoing diagnostic, vaccine, and bio-therapeutics efforts.

**Program Portrait: Glycomics: The Grand Challenge of Deciphering the Third Molecular Language of Cells**

FY 2012 level: \$20,011,587

FY 2013 level: \$20,032,331

Change: \$20,744

Vastly diverse, and information-rich, complex carbohydrate molecules called glycans are attached to proteins and lipids in our bodies helping to control the function of these basic building blocks of life. Glycans interact with specific proteins crucial to cellular function and immune defense, including enzymes, hormones, toxins, antibodies, and virtually all disease-causing microorganisms. Glycans and the proteins or lipids they attach to are central to numerous biological processes such as cell growth, recognition, and differentiation. In addition, they are involved in disease processes, including metastasis (the spread of cancer cells), inflammation, and infection. These properties of glycans make them promising targets for drug development and as drug delivery systems, and they may also serve as biomarkers that serve as surrogates for detecting and/or monitoring disease. NIGMS supports studies of the synthesis, structure, and functions of glycans and their binding proteins. In 2001, NIGMS awarded the first NIH-sponsored, large-scale glycomics study, a “glue” grant. This 10-year effort brought together an international consortium of 590 laboratories, and it established valuable resources for deciphering what has been nicknamed the third molecular language of cells, beyond those of genes and proteins. Results from this consortium have greatly improved our understanding of how the immune system functions. NIGMS continues to build on the efforts of this glycomics consortium through its support of new methods for glycan synthesis, a glycan array screening center, and glycomic database development. NIGMS is working with the National Institute of Allergy and Infectious Diseases, the Centers for Disease Control and Prevention, and the National Cancer Institute to leverage resources (enzymes, standards, databases, and fast, efficient assays) for studies of field samples of avian flu, investigations of innate immunity, vaccine development, and biomarker discovery. NIGMS also chairs a trans-agency committee that includes the Food and Drug Administration, the National Institute of Standards and Technology, and the National Science Foundation; this committee coordinates efforts toward developing chemical and structural standards for the field of glycomics.

**Division of Biomedical Technology, Bioinformatics and Computational Biology (BBCB):**

The BBCB program supports research that draws expertise from mathematics, statistics, computer science, engineering, and physics to solve problems in biomedicine. BBCB emphasizes integrated systems approaches that combine computational studies with laboratory-based investigations that authenticate models. The program’s Biomedical Technology Research Centers create critical, often unique technologies and methods at the forefront of their respective fields, and apply them to a broad range of basic, translational, and clinical research. In FY 2011, BBCB funded three new projects under NIGMS’ Models of Infectious Disease Agent Study that enlist computers to identify strategies to control contagious diseases. Also in FY 2011, BBCB announced its intent to encourage research in the area of modeling social behavior; this research is expected to begin in FY 2012.

**Budget Policy:** The FY 2013 President’s Budget request for the BBCB program is \$252.802 million, an increase of \$262 thousand or 0.10 percent over the FY 2012 Enacted level. As with all NIGMS programs, highest priority will go to investigator-initiated research that explores complex biological systems. Major initiatives employing FY 2013 funds include the Models of Infectious Disease Agent Study (MIDAS), which models the spread of infectious diseases; biomedical technology research; and the systems biology centers program.

**Division of Training, Workforce Development, and Diversity (TWD):** The TWD program oversees and coordinates NIGMS policies and efforts related to research training, and it is the

Institute's focal point for facilitating the development of a diverse and inclusive biomedical research workforce. A major activity within the TWD is the training of Ph.D. and M.D.-Ph.D. students as well as postdoctoral fellows through advanced and specialized training in basic, translational, and clinical research. The TWD promotes workforce diversity through innovative approaches, including the Institutional Development Award (IDeA) program that supports research infrastructure development at institutions in states that have received limited NIH research support. Other TWD programs support institutions serving a substantial number of students from groups underrepresented in the biomedical sciences. In FY 2011, NIGMS issued its Strategic Plan for Biomedical and Behavioral Research Training, and is actively implementing the action items therein.

**Budget Policy:** The FY 2013 President's Budget request for the TWD program is \$586.417 million, a decrease of \$50.000 million or 7.86 percent under the FY 2012 Enacted level. The Budget includes \$225.438 million for IDeA in FY 2013, \$50.519 million below the FY 2012 level, to focus the Institute's resources on other research priorities. Highest funding priority will go to activities that promote diversity in the biomedical research workforce through research training activities that involve undergraduate, predoctoral, and postdoctoral students; and other efforts that support institutions that serve a substantial number of students from groups underrepresented in the biomedical sciences.

**Intramural:** The Institute has a small, but unique intramural research program, the NIGMS Pharmacology Research Associate program, which supports postdoctoral research fellows for up to three years. There are presently 16 fellows in the program. They pursue research under the guidance of a tenured investigator from either an NIH or FDA laboratory and receive specialized training and career mentoring from NIGMS staff. The program is intended for basic or clinical scientists seeking advanced training in pharmacology, or for pharmacology trainees who wish to broaden their skill sets in another area of biomedicine. A number of former program participants have gone on to distinguished careers in academia, industry, and government, and one has won a Nobel Prize. Fellows in this program have recently won special honors for their innovative research in various areas of biomedicine, including stem cell biology, neurodegenerative disease, and immunology.

**Budget Policy:** The FY 2013 President's Budget request for the Intramural Research program is \$2.793 million, a decrease of \$23 thousand or 0.82 percent under the FY 2012 Enacted level. NIGMS will continue its Pharmacology Research Associate Training (PRAT) program, which provides training for outstanding postdoctoral research fellows who conduct research in intramural laboratories of other NIH institutes and centers or in FDA laboratories. After their NIH training, PRAT fellows continue their careers as faculty at leading universities, in the pharmaceutical industry, or at government agencies, contributing pharmacology expertise and helping to meet national needs in science and medicine.

**Research Management and Support (RMS):** RMS provides administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants, training awards, and research and development contracts. The RMS program also encompasses strategic planning, coordination, and evaluation of the Institute's 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, conduct portfolio analyses, and assist with document and content management. In FY 2013, RMS funds will be used to enable cloud services on the current NIGMS computing virtual environment, which will reduce the Institute's software and equipment costs, as well as enhance flexibility and improve the speed of application deployments to better serve the business needs of NIGMS and its customers.

Budget Policy: The FY 2013 President's Budget request for RMS is \$65.202 million, a decrease of \$116 thousand or 0.18 percent under the FY 2012 Enacted level. In FY 2013, RMS funds will manage the Office of Emergency Care Research (OECR). The office will serve as the primary NIH coordinating component for emergency care research, coordinate relevant emergency medicine efforts across NIH, and communicate with the extramural community and other federal agencies. RMS funds will continue to contribute to the administration of the NIH OppNet.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

**Budget Authority by Object**  
**(Dollars in Thousands)**

	<b>FY 2012 Enacted</b>	<b>FY 2013 PB</b>	<b>Increase or Decrease</b>
Total compensable workyears:			
Full-time employment	165	163	(2)
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary ( <i>in dollars</i> )	\$174,688	\$174,688	\$0
Average GM/GS grade	13.0	13.0	0.0
Average GM/GS salary ( <i>in dollars</i> )	\$114,882	\$115,313	\$431
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207) ( <i>in dollars</i> )	\$0	\$0	\$0
Average salary of ungraded positions ( <i>in dollars</i> )	0	0	0
<b>OBJECT CLASSES</b>	<b>FY 2012 Enacted</b>	<b>FY 2013 PB</b>	<b>Increase or Decrease</b>
Personnel Compensation:			
11.1 Full-time permanent	\$12,846	\$12,761	(\$85)
11.3 Other than full-time permanent	5,531	5,523	(8)
11.5 Other personnel compensation	574	572	(2)
11.7 Military personnel	0	0	0
11.8 Special personnel services payments	358	361	3
<b>Total, Personnel Compensation</b>	<b>\$19,309</b>	<b>\$19,217</b>	<b>(\$92)</b>
12.0 Personnel benefits	\$5,044	\$4,997	(\$47)
12.2 Military personnel benefits	0	0	0
13.0 Benefits for former personnel	0	0	0
<b>Subtotal, Pay Costs</b>	<b>\$24,353</b>	<b>\$24,214</b>	<b>(\$139)</b>
21.0 Travel and transportation of persons	\$540	\$514	(\$26)
22.0 Transportation of things	17	17	0
23.1 Rental payments to GSA	0	0	0
23.2 Rental payments to others	0	0	0
23.3 Communications, utilities and miscellaneous charges	274	274	0
24.0 Printing and reproduction	760	670	(90)
25.1 Consulting services	368	368	0
25.2 Other services	9,905	10,327	422
25.3 Purchase of goods and services from government accounts	109,164	116,687	7,523
25.4 Operation and maintenance of facilities	34	35	1
25.5 Research and development contracts	(192)	6,340	6,532
25.6 Medical care	22	22	0
25.7 Operation and maintenance of equipment	299	301	2
25.8 Subsistence and support of persons	0	0	0
<b>25.0 Subtotal, Other Contractual Services</b>	<b>\$119,600</b>	<b>\$134,080</b>	<b>\$14,480</b>
26.0 Supplies and materials	\$148	\$147	(\$1)
31.0 Equipment	373	373	0
32.0 Land and structures	0	0	0
33.0 Investments and loans	0	0	0
41.0 Grants, subsidies and contributions	2,281,124	2,218,546	(62,578)
42.0 Insurance claims and indemnities	0	0	0
43.0 Interest and dividends	0	0	0
44.0 Refunds	0	0	0
<b>Subtotal, Non-Pay Costs</b>	<b>\$2,402,836</b>	<b>\$2,354,621</b>	<b>(\$48,215)</b>
<b>Total Budget Authority by Object</b>	<b>\$2,427,189</b>	<b>\$2,378,835</b>	<b>(\$48,354)</b>

Includes FTEs which are reimbursed from the NIH Common Fund.

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

**Salaries and Expenses**  
**(Dollars in Thousands)**

OBJECT CLASSES	FY 2012 Enacted	FY 2013 PB	Increase or Decrease
<b>Personnel Compensation:</b>			
Full-time permanent (11.1)	\$12,846	\$12,761	(\$85)
Other than full-time permanent (11.3)	5,531	5,523	(8)
Other personnel compensation (11.5)	574	572	(2)
Military personnel (11.7)	0	0	0
Special personnel services payments (11.8)	358	361	3
<b>Total Personnel Compensation (11.9)</b>	<b>\$19,309</b>	<b>\$19,217</b>	<b>(\$92)</b>
Civilian personnel benefits (12.1)	\$5,044	\$4,997	(\$47)
Military personnel benefits (12.2)	0	0	0
Benefits to former personnel (13.0)	0	0	0
<b>Subtotal, Pay Costs</b>	<b>\$24,353</b>	<b>\$24,214</b>	<b>(\$139)</b>
Travel (21.0)	\$540	\$514	(\$26)
Transportation of things (22.0)	17	17	0
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	274	274	0
Printing and reproduction (24.0)	760	670	(90)
<b>Other Contractual Services:</b>			
Advisory and assistance services (25.1)	368	368	0
Other services (25.2)	9,905	10,327	422
Purchases from government accounts (25.3)	36,187	38,833	2,646
Operation and maintenance of facilities (25.4)	34	35	1
Operation and maintenance of equipment (25.7)	299	301	2
Subsistence and support of persons (25.8)	0	0	0
<b>Subtotal Other Contractual Services</b>	<b>\$46,793</b>	<b>\$49,864</b>	<b>\$3,071</b>
Supplies and materials (26.0)	\$148	\$147	(\$1)
<b>Subtotal, Non-Pay Costs</b>	<b>\$48,532</b>	<b>\$51,486</b>	<b>\$2,954</b>
<b>Total, Administrative Costs</b>	<b>\$72,885</b>	<b>\$75,700</b>	<b>\$2,815</b>

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**  
**Details of Full-Time Equivalent Employment (FTEs)**

OFFICE/DIVISION	FY 2011 Actual			FY 2012 Enacted			FY 2013 PB		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director									
Direct:	11	0	11	11	0	11	12	0	12
Reimbursable:	2	0	2	2	0	2	2	0	2
Total:	13	0	13	13	0	13	14	0	14
Office of Scientific Review									
Direct:	13	0	13	13	0	13	13	0	13
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	13	0	13	13	0	13	13	0	13
Office of Administrative Management									
Direct:	27	0	27	27	0	27	26	0	26
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	27	0	27	27	0	27	26	0	26
Office of Extramural Activities									
Direct:	39	0	39	39	0	39	37	0	37
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	39	0	39	39	0	39	37	0	37
Division of Genetic and Developmental Biology									
Direct:	11	0	11	11	0	11	11	0	11
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	11	0	11	11	0	11	11	0	11
Division of Pharmacology, Physiology and Biological Chemistry									
Direct:	24	0	24	24	0	24	24	0	24
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	24	0	24	24	0	24	24	0	24
Division of Cell Biology and Biophysics									
Direct:	12	0	12	12	0	12	12	0	12
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	12	0	12	12	0	12	12	0	12
Division of Biomedical Technology, Bioinformatics and Computational Biology									
Direct:	11	0	11	11	0	11	11	0	11
Reimbursable:	1	0	1	1	0	1	1	0	1
Total:	12	0	12	12	0	12	12	0	12
Division of Training, Workforce Development and Diversity									
Direct:	14	0	14	14	0	14	14	0	14
Reimbursable:	0	0	0	0	0	0	0	0	0
Total:	14	0	14	14	0	14	14	0	14
<b>Total</b>	<b>165</b>	<b>0</b>	<b>165</b>	<b>165</b>	<b>0</b>	<b>165</b>	<b>163</b>	<b>0</b>	<b>163</b>
Includes FTEs which are reimbursed from the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements	0	0	0	0	0	0	0	0	0
<b>FISCAL YEAR</b>	<b>Average GS Grade</b>								
2009	12.7								
2010	12.8								
2011	13.0								
2012	13.0								
2013	13.0								

**NATIONAL INSTITUTES OF HEALTH**  
**National Institute of General Medical Sciences**

**Detail of Positions**

GRADE	FY 2011 Actual	FY 2012 Enacted	FY 2013 PB
Total, ES Positions	1	1	1
Total, ES Salary	174,688	174,688	174,688
GM/GS-15	17	17	17
GM/GS-14	47	47	47
GM/GS-13	28	28	27
GS-12	20	20	20
GS-11	8	8	8
GS-10	0	0	0
GS-9	4	4	3
GS-8	3	3	3
GS-7	1	1	1
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	129	129	127
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	41	41	41
Total permanent positions	125	125	125
Total positions, end of year	171	171	169
Total full-time equivalent (FTE) employment, end of year	165	165	163
Average ES salary	174,688	174,688	174,688
Average GM/GS grade	13.0	13.0	13.0
Average GM/GS salary	114,882	114,882	115,313

Includes FTEs which are reimbursed from the NIH Common Fund.