

DEPARTMENT OF HEALTH AND HUMAN SERVICES

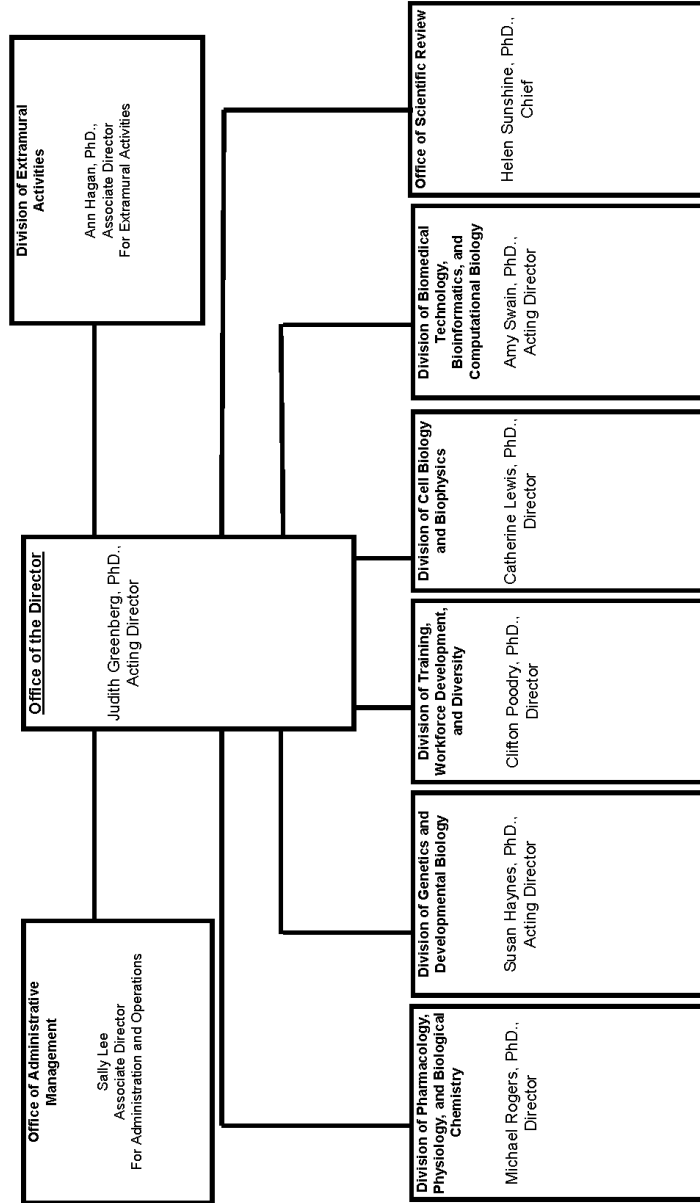
NATIONAL INSTITUTES OF HEALTH

National Institute of General Medical Sciences (NIGMS)

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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, \$2,401,011,000.

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

Amounts Available for Obligation ¹
(Dollars in Thousands)

Source of Funding	FY 2012 Actual	FY 2013 CR	FY 2014 PB
Appropriation	2,434,637	2,444,907	2,401,011
Rescission	(4,601)	0	0
Subtotal, adjusted appropriation	2,430,036	2,444,907	2,401,011
Secretary's Transfer for Alzheimer's disease (AD)	(1,601)	0	0
Secretary's Transfer for AIDS authorized by PL 112-74, Section 206	(692)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(2,220)	(2,876)	0
Subtotal, adjusted budget authority	2,425,522	2,442,031	2,401,011
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	2,425,522	2,442,031	2,401,011
Unobligated balance lapsing	(164)	0	0
Total obligations	2,425,358	2,442,031	2,401,011

¹ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2012 - \$1,292 FY 2013 - \$5,002 FY 2014 - \$5,005

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

MECHANISM	FY 2012 Actual		FY 2013 CR		FY 2014 PB		Change vs. FY 2012	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants								
<u>Research Projects</u>								
Noncompeting	2,785	\$1,039,058	2,835	\$1,077,160	2,823	\$1,077,752	38	\$38,694
Administrative Supplements	(185)	13,197	(185)	13,197	(185)	13,197	(0)	0
Competing:								
Renewal	443	175,740	421	169,616	420	166,899	-23	-8,841
New	524	174,138	528	173,638	540	180,175	16	6,037
Supplements	1	115	0	0	0	0	-1	-115
Subtotal, Competing	968	\$349,993	949	\$343,254	960	\$347,074	-8	-\$2,919
Subtotal, RPGs	3,753	\$1,402,248	3,784	\$1,433,611	3,783	\$1,438,023	30	\$35,775
SBIR/STTR	168	62,409	170	63,115	174	64,687	6	2,278
Research Project Grants	3,921	\$1,464,656	3,954	\$1,496,726	3,957	\$1,502,710	36	\$38,054
<u>Research Centers</u>								
Specialized/Comprehensive	159	426,909	152	409,598	133	357,109	-26	-69,800
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	33	62,024	33	62,874	35	67,274	2	5,250
Comparative Medicine	0	392	0	392	0	392	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	192	\$489,325	185	\$472,864	168	\$424,775	-24	-\$64,550
<u>Other Research</u>								
Research Careers	92	23,359	92	23,359	92	23,359	0	0
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	329	104,567	329	104,567	329	104,567	0	0
Other	141	39,681	138	38,831	122	34,431	-19	-5,250
Other Research	562	\$167,607	559	\$166,757	543	\$162,357	-19	-\$5,250
Total Research Grants	4,675	\$2,121,588	4,698	\$2,136,347	4,668	\$2,089,842	-7	-\$31,746
<u>Ruth L. Kirschstein Training Awards</u>	<u>FTIPs</u>		<u>FTIPs</u>		<u>FTIPs</u>		<u>FTIPs</u>	
Individual	415	19,380	415	19,380	415	19,610	0	230
Institutional	3,905	181,301	3,905	181,301	3,905	183,680	0	2,379
Total Research Training	4,320	\$200,681	4,320	\$200,681	4,320	\$203,290	0	\$2,609
Research & Development Contracts	27	35,322	28	36,666	28	39,542	1	4,220
<i>SBIR/STTR (non-add)</i>	(0)	(132)	(0)	(2,132)	(0)	(2,132)	(0)	+(2,000)
	<u>FTEs</u>		<u>FTEs</u>		<u>FTEs</u>		<u>FTEs</u>	
Intramural Research	10	2,882	11	2,882	11	2,882	1	0
Research Management and Support	147	65,049	195	65,455	195	65,455	48	406
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIGMS	157	\$2,425,522	206	\$2,442,031	206	\$2,401,011	49	-\$24,511

¹ All items in italics and brackets are "non-adds".

Major Changes in the Fiscal Year 2014 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 2014 President's Budget for NIGMS, which is \$24.5 million less than the FY 2012 Actual level, for a total of \$2,401.0 million.

Research Project Grants (+\$38.054 million; total \$1,502.710 million): In FY 2014, NIGMS will increase support of research grants in HIV/AIDS research and research project grants from investigators within IDeA eligible states through the IDeA program. In accordance with SBIR/STTR reauthorizing legislation additional support will be provided to small business applicants in FY 2014. NIH budget policy for RPGs in FY 2014, continues FY 2012 policy of eliminating inflationary increases for future year commitments. However adjustments for special needs (such as equipment and added personnel) will continue to be accommodated.

Research Center Grants (-\$64.550 million; total \$424.775 million): In FY 2014 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 components. A one-time budget increase in the research center portfolio provided in FY 2012 did not generate commitments for FY 2014.

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

FY 2012 Actual		\$2,425,522		
FY 2014 President's Budget		\$2,401,011		
Net change		-\$24,511		
CHANGES	2014 President's Budget		Change from FY 2012	
	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of March 2013 pay increase & benefits		\$1,513		\$4
b. January FY 2014 pay increase & benefits		1,513		11
c. One more day of pay		1,513		6
d. Differences attributable to change in FTE		1,513		0
e. Payment for centrally furnished services		165		2
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		1,204		0
Subtotal				\$23
2. Research Management and Support:				
a. Annualization of March 2013 pay increase & benefits		\$29,709		\$73
b. January FY 2014 pay increase & benefits		29,709		220
c. One more day of pay		29,709		112
d. Differences attributable to change in FTE		29,709		0
e. Payment for centrally furnished services		12,281		221
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		23,465		2
Subtotal				\$628
Subtotal, Built-in				\$651

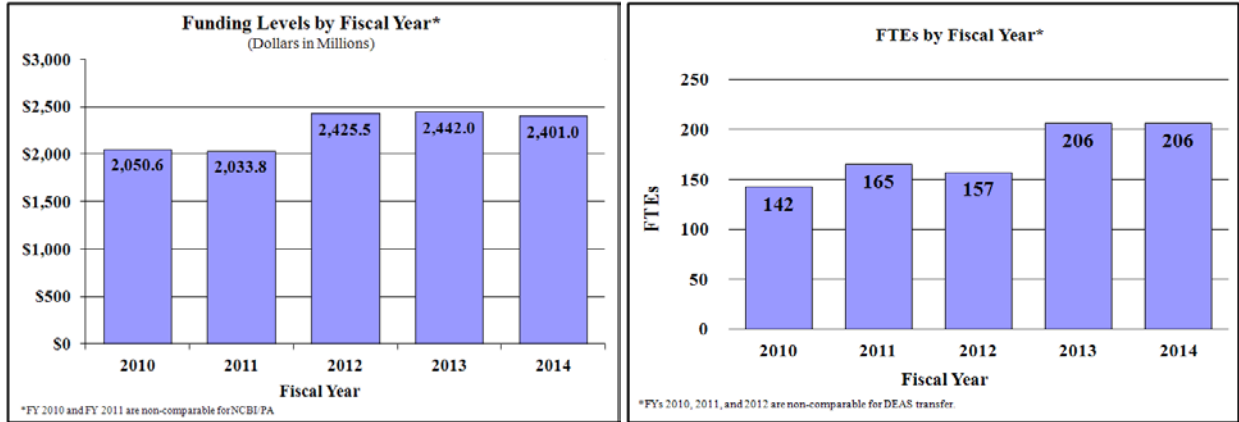
NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Summary of Changes--continued

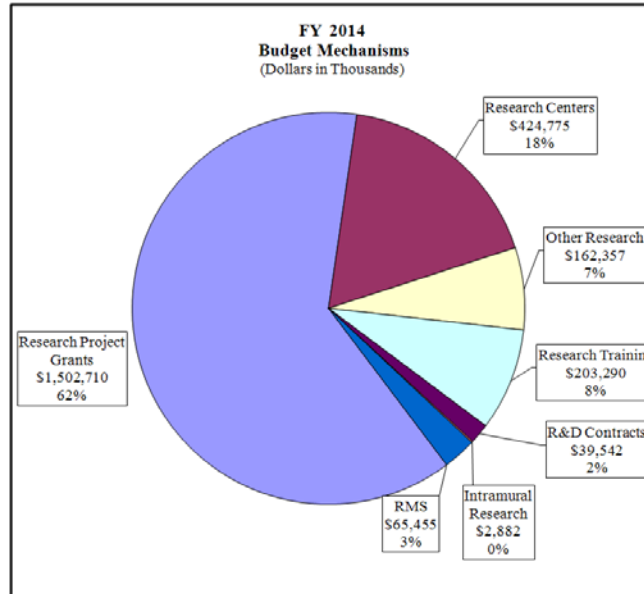
CHANGES	2014 President's Budget		Change from FY 2012	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	2,823	\$1,090,949	38	\$38,695
b. Competing	960	347,074	-8	-2,919
c. SBIR/STTR	174	64,687	6	2,278
Total	3,957	\$1,502,710	36	\$38,054
2. Research Centers	168	\$424,775	-24	-\$64,550
3. Other Research	543	162,357	-19	-5,250
4. Research Training	4,320	203,290	0	2,609
5. Research and development contracts	28	39,542	1	4,220
Subtotal, Extramural		\$2,332,674		-\$24,917
6. Intramural Research	<u>FTEs</u> 11	\$2,882	<u>FTEs</u> 1	-\$23
7. Research Management and Support	195	65,455	48	-222
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program	206	\$2,401,011	49	-\$25,162
Total changes				-\$24,511

Fiscal Year 2014 Budget Graphs

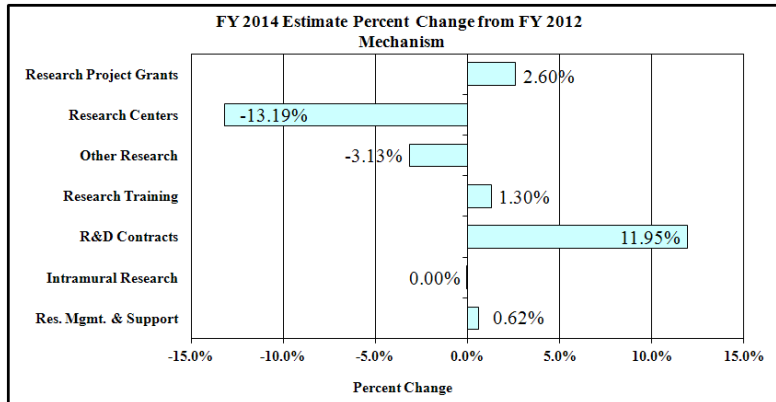
History of Budget Authority and FTEs:



Distribution by Mechanism:



Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences
Budget Authority by Activity^{1,2}
(Dollars in Thousands)

	FY 2012 Actual		FY 2013 CR		FY 2014 PB		Change vs. FY 2012	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
Extramural Research								
Detail:								
Cell Biology and Biophysics		\$562,893		\$566,891		\$569,260		6,367
Biomedical Technology, Bioinformatics and Computational Biology		236,723		238,404		239,400		2,677
Genetics and Developmental Biology		520,284		523,339		525,526		5,242
Pharmacology, Physiology and Biological Biological Chemistry		400,507		403,351		405,036		4,529
Training, Workforce Development and Diversity		637,184		641,709		593,452		(43,732)
<i>Institutional Development Award (IDeA) (non-add)</i>		275,957		277,646		225,438		(50,519)
Subtotal, Extramural		\$2,357,591		\$2,373,694		\$2,332,674		(24,917)
Intramural Research	10	\$2,882	11	\$2,882	11	\$2,882	1	(\$0)
Research Management & Support	147	\$65,049	195	\$65,455	195	\$65,455	48	\$406
TOTAL	157	\$2,425,522	206	\$2,442,031	206	\$2,401,011	49	(\$24,511)

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

2. Includes 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

	PHS Act/ Other Citation	U.S. Code Citation	2013 Amount Authorized	FY 2013 CR	2014 Amount Authorized	FY 2014 PB
Research and Investigation	Section 301	42§241	Indefinite	\$2,442,031,000	Indefinite	\$2,401,011,000
National Institute of General Medical Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				\$2,442,031,000		\$2,401,011,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
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				-
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				-
2010	\$2,023,677,000	\$2,069,156,000	\$2,031,886,000	\$2,051,798,000
Rescission				-
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	-
Rescission				-
2014	\$2,401,011,000	-	-	-

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 2012 Actual	FY 2013 CR	FY 2014 President's Budget	FY 2014 +/- FY 2012
BA	\$2,425,522,000	\$2,442,031,000	\$2,401,011,000	-\$24,511,000
FTE	157	206	206	+49

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

Director's Overview

Since 1962, the National Institute of General Medical Sciences (NIGMS) has built a solid foundation of knowledge that has been the basis for new understandings about the human body and its failings, as well as rational strategies toward new ways to diagnose, treat, and prevent a range of diseases. Science continues to evolve, and today's challenges require understanding and analysis of systems—of molecules and cells, organs, organisms, and communities—forcing a re-thinking of the way we approach the diagnosis and treatment of illness. A workforce diverse in thought, experience, and practice is best suited to take advantage of both the incredible opportunities and difficult challenges before us.

Today's Basic Science for Tomorrow's Breakthroughs

The 2012 Nobel Prize in Chemistry recognized the discovery of cellular receptors that transmit signals from the environment to the body, often through communication systems called G-proteins. This NIGMS-supported discovery builds upon knowledge recognized by another Nobel prize awarded 15 years ago to NIGMS-funded scientists that first identified G-proteins. Working together like a lock-and-key apparatus, G-proteins and their receptors are indispensable for sensing and responding to our environment. Moreover, more than half of all medications work via G-proteins and their receptors; thus, this knowledge has made—and continues to make—an indelible mark on the development and refinement of safe and effective medications for a range of health conditions that affect people in the United States and throughout the world.

Today, NIGMS continues its research investment in pharmacology, the study of how the human body interacts with medications, such as those that operate through G-protein signaling. With recent advances in genomics, modern research benefits from a systems approach that integrates expertise from quantitative scientists, including computer scientists, mathematicians, physicists, and engineers. NIGMS plans to invest in these important collaborations in pharmacology and

other mission areas, including the burgeoning field of glycomics that aims to understand more fully the body's compendium of natural sugar molecules. Glycomics research continues to inform our understanding of innate immunity, vaccine development, and biomarker discovery, a critical element of precision diagnostics.

For many years, NIGMS has supported non-targeted research on circadian rhythms the body's day-night patterns of activity. Circadian studies in model organisms—bacteria, plants, flies, and mice—have resulted in recent, unexpected findings relevant to human health. It is now clear that circadian rhythms govern key metabolic pathways and even contribute to disease states such as diabetes and obesity. This past year, NIGMS-funded scientists pinpointed the identity of a key substance called a cryptochrome, which sets biological timing and also controls glucose production in the liver. NIGMS-funded scientists are currently working on developing ways to block this cryptochrome system as a way of keeping under control the body's metabolism of protein, fat, and sugar.

Advancing Translational Sciences

NIGMS supports clinically related research in the sciences that span the interests of multiple categorical institutes at NIH, and many of these investigations have made direct contributions to health care. For example, the NIGMS-led NIH Pharmacogenomics Research Network (PGRN) is working toward changing one-size-fits-all prescribing patterns into a much more precise and personalized strategy. This past year, for example:

- PGRN researchers at the University of Florida developed a simple blood test that predicts drug response in people taking the blood thinner clopidogrel, also sold as Plavix, and then adds the results to the person's electronic medical record. Millions of Americans take this important drug to prevent heart attacks and strokes.
- PGRN researchers at the Stanford University School of Medicine developed a computer algorithm that sifts through millions of reports to the U.S. Food and Drug Administration to predict dangerous, yet unsuspected interactions between medications. Predictive medicine approaches such as this highlight the value of systems analyses of biomedical information.

Emblematic of the NIGMS commitment to supporting clinically relevant research on whole-body system failure, the unfortunate hallmark of life-threatening burn and severe physical trauma, the Institute continues to invest in burn and trauma centers at hospitals nationwide. These centers continue to make key discoveries that help shape clinical practice in the treatment of critically ill patients. To help coordinate activities in emergency medicine research that cut across multiple NIH components, NIH established the Office of Emergency Care Research (OECR), which NIGMS houses, in 2012. The Office of Emergency Care Research will serve as the agency lead for coordinating basic, clinical, and translational biomedical research and research training within emergency care settings.

Recruiting and Retaining Diverse Scientific Talent and Creativity

One year after NIGMS published *Investing in Discovery*, a strategic plan for the Institute's biomedical and behavioral research training programs, implementation of many key items is well under way through a blend of Institute policy changes, recommendations, and guidance to academic institutions that are important partners in research training. Separately, the NIH Advisory Committee to the Director released two reports that speak to the NIH's role in research training and promoting a diverse biomedical workforce. NIGMS is currently pursuing a range of approaches that will strengthen and complement the Committee's recommendations. NIGMS is also leading an agency-wide research effort to understand why more women than men leave science careers and to identify effective interventions to increase the participation of women in the biomedical and behavioral research workforce.

In 2012, NIGMS became the new home the Institutional Development Award (IDeA) program, whose mission is to broaden the geographic distribution of NIH funding. Highlights from the past year include an IDeA-funded effort in Arkansas that established a "Telenursery" network of 15 telemedicine units with real-time teleconferencing and diagnostic-quality imaging in neonatal intensive care units. The project enhances access to specialty care for high-risk pregnancies in rural and underserved populations, which should improve health outcomes for low birth-weight infants. The project is an outstanding example of how federal funding can enable states to meet the needs of their own unique populations.

Overall Budget Policy: The FY 2014 President's Budget request is \$2,401.011 million, a decrease of \$24.511 million, or -1.0 percent below the FY 2012 Actual 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 2014, NIGMS will continue to support new investigators and maintain an adequate number of competing research project grants.

NIGMS also funds the IDeA program, which aims to broaden the geographic distribution of NIH funding for biomedical and behavioral research. This effort aims to increase 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. Support for the NRSA training mechanism will be increased by \$2.609 million to cover the cost of increased stipends. The Ruth L. Kirschstein NRSA budget reflects a stipend increase to \$42,000 for the entry level postdoctoral trainees and fellows along with 4.0 percent increases for each subsequent level of experience. These increases are consistent with stipend increases recommended by the Advisory Committee to the NIH Director and the National Research Council. In addition, this increase is consistent with 42 USC 288(b)(5), which anticipates periodic adjustments in stipends "to reflect increases in the cost of living." Stipend rates for predoctoral trainees and fellows will also increase by 2.0 percent.

Intramural Research will remain at the FY 2012 level and Research Management and Support (RMS) programs will receive a modest increase to support the newly created Office of Emergency Care Research.

Funds are included in R&D contracts to support a new Small Business Innovation Research (SBIR) Glycan Library contract as endorsed by the National Advisory General Medical Sciences Council. Funds are also included to support trans-NIH initiatives, such as the Basic Behavioral and Social Sciences Opportunity Network (OppNet).

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 program promotes the development of precise, targeted therapies, as well as diagnostics for a range of diseases. In FY 2012, the program continued with the third phase of the Protein Structure Initiative (PSI), PSI:Biology (see Portrait, page 17), which makes useful protein structure resources available to the broad scientific community. The PSI:Biology initiative is expected to continue through FY 2015. In FY 2012, CBB re-announced its support of the AIDS-Related Structural Biology Program and launched a new program to investigate macromolecular interactions in cells.

Budget Policy: The FY 2014 President's Budget estimate for the CBB program is \$569.260 million, an increase of \$6.367 million, or 1.1 percent above the FY 2012 Actual 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 2014, 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 2014 funds to support its PSI:Biology program, as well as for its existing AIDS-related structural biology program.

Program Portrait: Protein Structure Initiative (PSI)**FY 2012 level:** \$72.1 million**FY 2014 level:** \$81.5 million**Change:** +\$9.4 million

Our genomic scripts contain many insights about what keeps us healthy and what makes us prone to illness. However, DNA-based information is just one piece of our overall well-being. Translating the language of the genome into useful biological and medical information is an enormous challenge that is being vigorously pursued by biomedical researchers across the globe. A key step in this process is figuring out what the genome's DNA codes mean—and this is done in part by identifying the physical structures of the proteins that genes encode. NIGMS has long supported structural biology, which employs high-energy radiation and powerful magnets to itemize the locations of individual atoms in protein molecules. To advance structural genomics efforts on a large scale, in 2000, NIGMS launched the Protein Structure Initiative (PSI). During its first 10-year phase, PSI-funded scientists deposited more than 5,000 structures in the public domain and advanced structural biology technologies to the point where researchers can now pursue protein structure determination by partnering with other research groups, or in some cases, performing experiments in their own labs using streamlined, user-friendly tools. The current focus of the PSI is the PSI:Biography initiative, which pairs PSI laboratories with individual biologists who may not have the means to acquire the necessary resources and expertise to solve protein structures relevant to their areas of study. PSI:Biography emerged from extensive discussions with the research community about the future of structural genomics and how NIGMS can best leverage its progress and expand its impact. All PSI:Biography-funded projects must address significant basic biomedical problems and use the protein structures to understand biological function. To broaden the reach of the PSI initiative, NIGMS has made two key PSI resources widely available to the scientific community. First, the Structural Biology Knowledgebase is a data portal that contains PSI-generated results, publications, and links to other structural biology resources. Second, the PSI Materials Repository stores, maintains, and distributes plasmids needed for structural biology experiments that have been created by the PSI centers. Currently, 30 PSI:Biography grants are funded, and enthusiasm from the scientific community has been robust.

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 plans to employ FY 2013 and FY 2014 funds to support human research that applies systematic approaches to better understand the genetic basis for health and disease. In FY 2012, GDB supported six program project grants to advance understanding of the basic biology of stem cells. In FY 2013, the program plans to continue its support of research on the biological principles underlying the microbial communities associated with the human body that play an important role in human health.

Budget Policy: The FY 2014 President's Budget estimate for the GDB program is \$525.526 million, an increase of \$5.242 million, or 1.0 percent above the FY 2012 Actual level. As with FY 2013, most GDB expenditures will support individual investigators seeking fundamental knowledge about life processes. In FY 2014, 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 2014 funds will also support research to explore interactions between hosts and microorganisms that make up the human microbiota. These relationships have a major impact on human health but remain poorly understood.

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, and anesthesia. In FY 2012, PPBC emphasized research in glycomics—the study of sugars, which are far less understood compared to proteins and nucleic acids. In FY 2013, the program will continue its glycomics support and also fund research in quantitative/systems pharmacology, aiming to enhance the predictive ability of efforts in drug discovery, development, and metabolism.

Budget Policy: The FY 2014 President’s Budget estimate for the PPBC program is \$405.036 million, an increase of \$4.529 million, or 1.1 percent above the FY 2012 Actual level. In FY 2014, 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 2014, the Pharmacogenomics Research Network will continue working toward promoting the goal of personalized medicine. PPBC will use FY 2014 funds to support research on high-throughput DNA- and bioinformatics-guided approaches for natural products discovery.

Division of Biomedical Technology, Bioinformatics and Computational Biology (BBCB): The BBCB program supports research to understand complex biological systems and develop research tools and methods—scientific instrumentation, software, models, and analytical approaches—to solve problems in biomedicine. One major BBCB effort is the Biomedical Technology Research Centers that create critical, pioneering technologies and methods, and apply them to a broad range of basic, translational, and clinical research efforts. These resources are used by thousands of NIH-supported scientists each year. Through its Systems Biology initiative, BBCB emphasizes integrated, systems approaches that combine computational studies with laboratory-based investigations that develop and authenticate research models. Another BBCB initiative, the Models of Infectious Disease Agent Study, supports computational and mathematical modeling to identify strategies to control infectious diseases (see Portrait on page 19). In FY 2013, BBCB also plans to support research on modeling social behavior.

Budget Policy: The FY 2014 President’s Budget estimate for the BBCB program is \$239.400 million, an increase of \$2.677 million, or 1.1 percent above the FY 2012 Actual level. As with all NIGMS programs, highest priority will go to investigator-initiated research that explores complex biological systems. Major initiatives employing FY 2014 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.

Program Portrait: Models of Infectious Disease Agent Study (MIDAS)

FY 2012 level: \$11.9 million

FY 2014 level: \$17.6 million

Change: +\$5.7 million

Predicting the spread of an infectious disease outbreak requires much more than simply connecting cities on a map. Accurate forecasting must consider many factors such as the characteristics of the disease-causing pathogen, policies put into place by public health officials, and human behavior. Since 2004, researchers who are part of the Models of Infectious Disease Agent Study (MIDAS) have been using computers to simulate how infectious diseases emerge and spread through communities, countries, and even continents. The results help health officials and policymakers prepare for actual outbreaks. This international research network comprised of scientists with a wide range of expertise can mobilize intellectual capital to undertake projects beyond the scope of any one group and related to a range of topics, including surveillance, intervention, and forecasting. NIGMS ensures the broad value of the MIDAS research investment by supporting educational, training, and career development opportunities, as well as sharing resources. For example, MIDAS has developed, and freely provides, model populations that are statistically identical to real populations. To date, MIDAS has had a measurable impact on policy, advising federal, state, and local government authorities as well as the World Health Organization on preparation for and response to outbreaks and pandemics. For example, during the 2009 H1N1 outbreak, MIDAS worked with public health officials on optimal use and distribution of vaccines, strategies for antiviral deployment, estimation of economic impacts of school closures, estimation of outbreak severity, surveillance strategies, and data collection and integration. More recent findings include a study published in 2012 showing that methicillin-resistant *Staphylococcus aureus*, or MRSA, infections are better prevented when hospitals cooperate and coordinate their infection control procedures. Another study demonstrated how human travel patterns contribute to malaria spread: This effort combined cell phone data from 15 million people in Kenya with detailed information on the regional incidence of malaria.

Division of Training, Workforce Development, and Diversity (TWD): The TWD program is the Institute's focal point for facilitating the development of a diverse and inclusive biomedical research workforce. A major TWD activity is supporting 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 program also supports the Institutional Development Award (IDeA) program that expands research infrastructure development at institutions in states that have historically received less NIH research support. New in FY 2013 and FY 2014 is an IDeA initiative that grows infrastructure and capacity to conduct clinical and translational research on diseases that affect medically underserved populations and/or diseases prevalent in IDeA states. In FY 2013 and FY 2014, a high-priority TWD activity will be to provide funds to selective institutions that already recruit and admit highly competitive students from underrepresented groups to ensure that more of those students attain Ph.D. degrees.

Budget Policy: The FY 2014 President's Budget estimate for the TWD program is \$593.452 million, a decrease of \$43.732 million, or 6.9 percent below the FY 2012 Actual level. The Budget includes \$225.438 million for IDeA in FY 2014, \$50.519 million below the FY 2012 level, to focus the Institute's resources on other research priorities. The budget includes a 1% increase in the Ruth L. Kirschstein NRSA training program to continue to support 4,320 trainees and provide a stipend increase. High priority will go to activities that promote diversity in the biomedical research workforce, in particular the Postbaccalaureate Research Education Program and the Initiative for Maximizing Student Development.

Intramural: The Institute has a small, but unique intramural research program; the NIGMS Postdoctoral Research Associate Program (PRAT), which supports postdoctoral research fellows (16, currently) for up to three years. The fellows pursue independent research under the guidance of a tenured investigator from an NIH laboratory and receive specialized training and career mentoring from NIGMS staff. From FY 2012 to FY 2014, NIGMS-funded PRAT fellows (basic or clinical scientists) will seek advanced training in specific emerging areas of science, notably quantitative/systems pharmacology and computational biology. Fellows in this highly regarded program have received various accolades for their innovative research in many areas of biomedicine, including stem cell biology, neurodegenerative disease, and immunology.

Budget Policy: The FY 2014 President's Budget estimate for the Intramural Research program is \$2.882 million, the same as the FY 2012 Actual level. NIGMS has renamed its Pharmacology Research Associate Training (PRAT) program to better reflect the diversity of projects and trainees. FY 2014 funds will provide training for outstanding postdoctoral research fellows who conduct quantitative/systems pharmacology and computational biology research in intramural laboratories of other NIH Institutes and Centers or in FDA laboratories.

Research Management and Support (RMS): The RMS program provides administrative, budgetary, logistical, and scientific support in 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 document and content management. In FY 2014, RMS funds will be used to enable Virtual Desktop Integration 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 desktop maintenance cycles to better serve the business needs of NIGMS and its customers.

Budget Policy: The FY 2014 President's Budget estimate for RMS is \$65.455 million, an increase of \$406 thousand, or 0.6 percent above the FY 2014 Actual level. In FY 2014, 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.

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Budget Authority by Object Class
(Dollars in Thousands)

	FY 2012 Actual	FY 2014 PB	Increase or Decrease
Total compensable workyears:			
Full-time employment	157	206	49
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary (in whole dollars)	\$174,688	\$0	(\$174,688)
Average GM/GS grade	13.2	13.2	0.0
Average GM/GS salary (in whole dollars)	\$114,244	\$116,255	\$2,011
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207) (in whole dollars)	\$0	\$0	\$0
Average salary of ungraded positions (in whole dollars)	\$132,577	\$134,238	\$1,661
OBJECT CLASSES	FY 2012 Actual	FY 2014 PB	Increase or Decrease
Personnel Compensation:			
11.1 Full-time permanent	\$12,844	\$17,599	\$4,755
11.3 Other than full-time permanent	4,731	6,220	1,489
11.5 Other personnel compensation	343	469	126
11.7 Military personnel	0	0	0
11.8 Special personnel services payments	314	322	8
Total, Personnel Compensation	\$18,232	\$24,610	\$6,378
12.0 Personnel benefits	\$4,896	\$6,612	\$1,716
12.2 Military personnel benefits	0	0	0
13.0 Benefits for former personnel	0	0	0
Subtotal, Pay Costs	\$23,128	\$31,222	\$8,094
21.0 Travel and transportation of persons	\$426	\$520	\$94
22.0 Transportation of things	9	9	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	282	282	0
24.0 Printing and reproduction	25	25	(0)
25.1 Consulting services	283	283	0
25.2 Other services	8,932	5,567	(3,365)
25.3 Purchase of goods and services from government accounts	110,551	119,236	8,685
25.4 Operation and maintenance of facilities	1	1	(0)
25.5 Research and development contracts	2,981	18,477	15,496
25.6 Medical care	0	0	0
25.7 Operation and maintenance of equipment	152	152	(0)
25.8 Subsistence and support of persons	\$0	0	0
25.0 Subtotal, Other Contractual Services	\$122,901	\$143,716	\$20,815
26.0 Supplies and materials	\$107	\$107	\$0
31.0 Equipment	279	279	0
32.0 Land and structures	0	0	0
33.0 Investments and loans	0	0	0
41.0 Grants, subsidies and contributions	2,278,366	2,224,851	(53,515)
42.0 Insurance claims and indemnities	0	0	0
43.0 Interest and dividends	0	0	(0)
44.0 Refunds	0	0	0
Subtotal, Non-Pay Costs	\$2,402,395	\$2,369,789	(\$32,606)
Total Budget Authority by Object Class	\$2,425,522	\$2,401,011	(\$24,511)

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

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Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2012 Actual	FY 2014 PB	Increase or Decrease
Personnel Compensation:			
Full-time permanent (11.1)	\$12,844	\$17,599	\$4,755
Other than full-time permanent (11.3)	4,731	6,220	1,489
Other personnel compensation (11.5)	343	469	126
Military personnel (11.7)	0	0	0
Special personnel services payments (11.8)	314	322	8
Total Personnel Compensation (11.9)	\$18,232	\$24,610	\$6,378
Civilian personnel benefits (12.1)	\$4,896	\$6,612	\$1,716
Military personnel benefits (12.2)	0	0	0
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	\$23,128	\$31,222	\$8,094
Travel (21.0)	\$426	\$520	\$94
Transportation of things (22.0)	9	9	0
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	282	282	0
Printing and reproduction (24.0)	25	25	0
Other Contractual Services:			
Advisory and assistance services (25.1)	283	283	0
Other services (25.2)	8,932	5,567	(3,365)
Purchases from government accounts (25.3)	34,100	29,923	(4,177)
Operation and maintenance of facilities (25.4)	1	1	0
Operation and maintenance of equipment (25.7)	152	152	0
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	\$43,468	\$35,926	(\$7,542)
Supplies and materials (26.0)	\$102	\$102	\$0
Subtotal, Non-Pay Costs	\$44,312	\$36,864	(\$7,448)
Total, Administrative Costs	\$67,440	\$68,086	\$646

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Details of Full-Time Equivalent Employment (FTEs)

OFFICE/DIVISION	FY 2012 Actual			FY 2013 CR			FY 2014 PB		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director									
Direct:	10	-	10	22	-	22	22	-	22
Reimbursable:	2	-	2	-	-	-	-	-	-
Total:	12	-	12	22	-	22	22	-	22
Office of Scientific Review									
Direct:	14	-	14	17	-	17	17	-	17
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	14	-	14	17	-	17	17	-	17
Office of Administrative Management									
Direct:	26	-	26	29	-	29	29	-	29
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	26	-	26	29	-	29	29	-	29
Office of Extramural Activities									
Direct:	38	-	38	41	-	41	41	-	41
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	38	-	38	41	-	41	41	-	41
Division of Genetic and Developmental Biology									
Direct:	11	-	11	16	-	16	16	-	16
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	11	-	11	16	-	16	16	-	16
Division of Pharmacology, Physiology and Biological Chemistry									
Direct:	23	-	23	29	-	29	29	-	29
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	23	-	23	29	-	29	29	-	29
Division of Cell Biology and Biophysics									
Direct:	11	-	11	16	-	16	16	-	16
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	11	-	11	16	-	16	16	-	16
Division of Biomedical Technology, Bioinformatics and Computational Biology									
Direct:	8	-	8	16	-	16	16	-	16
Reimbursable:	1	-	1	1	-	1	1	-	1
Total:	9	-	9	17	-	17	17	-	17
Division of Training, Workforce Development and Diversity									
Direct:	13	-	13	19	-	19	19	-	19
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	13	-	13	19	-	19	19	-	19
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
Total	157	0	157	206	0	206	206	0	206
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.									
FISCAL YEAR				Average GS Grade					
2010				12.7					
2011				12.7					
2012				13.2					
2013				13.2					
2014				13.2					

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Detail of Positions

GRADE	FY 2012 Actual	FY 2013 CR	FY 2014 PB
Total, ES Positions	1	0	0
Total, ES Salary	\$174,688	\$0	\$0
GM/GS-15	18	26	26
GM/GS-14	49	72	72
GM/GS-13	30	40	40
GS-12	15	26	26
GS-11	6	10	10
GS-10	0	0	0
GS-9	2	2	2
GS-8	3	3	3
GS-7	1	3	3
GS-6	0	0	0
GS-5	0	0	0
GS-4	1	1	1
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	125	183	183
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	44	44
Total permanent positions	126	165	165
Total positions, end of year	171	224	224
Total full-time equiv (FTE) at YE	157	206	206
Average ES salary	\$174,688	\$0	\$0
Average GM/GS grade	13.2	13.2	13.2
Average GM/GS salary	\$114,244	\$114,244	\$116,255

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