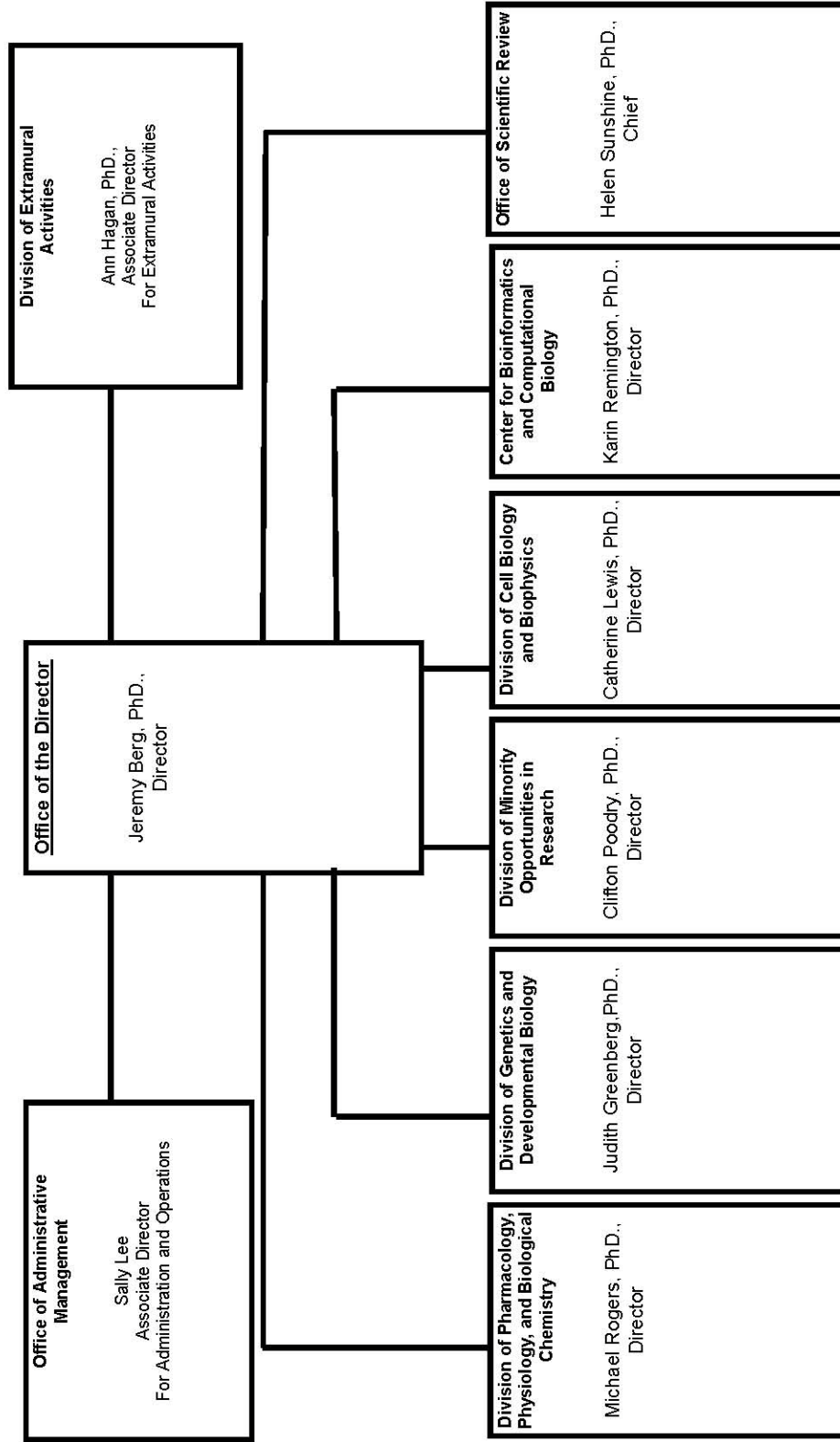


DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences (NIGMS)

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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 Public Health Services Act with respect to general medical sciences [\$2,051,798,000] **\$2,125,090,000** (Public Law 111-117, Consolidated Appropriations Act, 2010)

**National Institutes of Health
National Institute of General Medical Sciences**

Amounts Available for Obligation 1/

Source of Funding	FY 2009 Actual	FY 2010 Enacted	FY 2011 PB
Appropriation	\$1,997,801,000	\$2,051,798,000	\$2,125,090,000
Type 1 Diabetes	0	0	0
Rescission	0	0	0
Supplemental	0	0	0
Subtotal, adjusted appropriation	1,997,801,000	2,051,798,000	2,125,090,000
Real transfer under Director's one-percent transfer authority (GEI)	-3,228,000	0	0
Real transfer to the Global Fund to fight HIV/AIDS, Malaria and Tuberculosis	0	0	0
Comparative transfer to NLM for NCBI	-315,000	-487,000	0
Comparative transfer under Director's one-percent transfer authority (GEI)	3,228,000	0	0
Comparative transfer to Public Access	-314,000	-339,000	0
Comparative transfer from DHHS for Autism	0	0	0
Subtotal, adjusted budget authority	1,997,172,000	2,050,972,000	2,125,090,000
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	1,997,172,000	2,050,972,000	2,125,090,000
Unobligated balance lapsing	-147,000	0	0
Total obligations	1,997,025,000	2,050,972,000	2,125,090,000

1/ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2009 - \$1,316,000 FY 2010 - \$5,000,000 FY 2011 - \$5,000,000

NATIONAL INSTITUTES OF HEALTH												
National Institute of General Medical Sciences												
(Dollars in Thousands)												
Budget Mechanism - Total												
MECHANISM	FY 2009		FY 2009 Recovery		FY 2010 Recovery		FY 2010		FY 2011		Change	
	Actual		Act Actual		Act Estimate		Enacted		PB			
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants:												
Research Projects:												
Noncompeting	2,925	\$1,029,167	0	\$0	207	\$81,451	2,865	\$1,039,465	2,754	\$1,025,533	(111)	-\$13,932
Administrative supplements	(201)	14,679	(1,004)	\$177,855	(373)	46,451	(274)	20,000	(279)	20,400	5	400
Competing:												
Renewal	487	192,922	96	30,548	0	0	493	200,191	542	224,509	49	24,318
New	377	115,606	135	61,999	6	9,715	420	132,019	459	147,176	39	15,157
Supplements	2	411	64	25,348	0	0	1	211	1	215	0	4
Subtotal, competing	866	308,939	295	117,895	6	9,715	914	332,421	1,002	371,900	88	39,479
Subtotal, RPGs	3,791	1,352,785	295	295,750	213	137,617	3,779	1,391,886	3,756	1,417,833	(23)	25,947
SBIR/STTR	148	48,390	2	7,019	3	645	148	48,414	150	48,473	2	59
Subtotal, RPGs	3,939	1,401,175	297	302,769	216	138,262	3,927	1,440,300	3,906	1,466,306	(21)	26,006
Research Centers:												
Specialized/comprehensive	49	173,899	21	12,992	20	7,743	50	171,781	53	176,944	3	5,163
Clinical research	0	0	0	0	0	0	0	0	0	0	0	0
Biotechnology	0	274	0	1,944	0	0	0	0	0	0	0	0
Comparative medicine	0	300	0	0	0	0	0	309	0	309	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal, Centers	49	174,473	21	14,936	20	7,743	50	172,090	53	177,253	3	5,163
Other Research:												
Research careers	89	19,273	0	3,723	0	0	96	19,562	103	20,149	7	587
Cancer education	0	0	0	0	0	0	0	0	0	0	0	0
Cooperative clinical research	0	0	0	0	0	0	0	0	0	0	0	0
Biomedical research support	0	0	0	0	0	0	0	0	0	0	0	0
Minority biomedical research support	319	99,404	1	14,910	0	1,707	332	100,895	344	103,922	12	3,027
Other	106	20,497	0	1,682	0	0	166	29,804	177	30,698	11	894
Subtotal, Other Research	514	139,174	1	20,315	0	1,707	594	150,261	624	154,769	30	4,508
Total Research Grants	4,502	1,714,822	319	338,020	236	147,712	4,571	1,762,651	4,583	1,798,328	12	35,677
Research Training:	FTEs		FTEs		FTEs		FTEs		FTEs			
Individual awards	495	21,329	0	0	0	0	495	21,329	495	22,588	0	1,259
Institutional awards	3,826	175,226	279	13,488	0	0	3,826	176,228	3,826	186,633	0	10,405
Total, Training	4,321	196,555	279	13,488	0	0	4,321	197,557	4,321	209,221	0	11,664
Research & development contracts (SBIR/STTR)	29	27,555	0	0	0	0	29	31,530	30	55,392	1	23,862
	(0)	(79)					(0)	(521)	(0)	(521)	(0)	(0)
Intramural research	11	2,577	0	0	0	0	10	2,616	11	2,700	1	84
Research management and support	127	55,663	0	284	0	5,684	127	56,618	132	59,449	5	2,831
Construction		0						0		0		0
Buildings and Facilities		0						0		0		0
Total, NIGMS	138	1,997,172		351,792		153,396	137	2,050,972	143	2,125,090	6	74,118

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences
BA by Program
(Dollars in thousands)

	FY 2007		FY 2008		FY 2009		FY 2009		FY 2010		FY 2011		Change	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
Extramural Research														
<u>Detail:</u>														
Cell Biology and Biophysics		\$589,856		\$558,114		\$565,374		\$565,374		\$578,413		\$597,763		19,350
Genetics and Developmental Biology		484,079		497,698		515,911		518,824		530,790		548,546		17,756
Pharmacology, Physiology and Biological Chemistry		399,290		413,595		417,127		417,127		426,747		441,023		14,276
Bioinformatics and Computational Biology		92,356		103,605		115,740		115,740		118,409		122,371		3,962
Minority Opportunities in Research		125,697		122,209		125,312		125,312		139,822		144,017		4,195
Training		188,606		191,973		196,555		196,555		197,557		209,221		11,664
Subtotal, Extramural		1,879,884		1,887,194		1,936,019		1,938,932		1,991,738		2,062,941		71,203
Intramural research	10	2,479		2,519	11	2,548	11	2,577	10	2,616	11	2,700	1	84
Res. management & support	123	50,217		53,163	127	55,859	127	55,663	127	56,618	132	59,449	5	2,831
TOTAL	133	1,932,580	0	1,942,876	138	1,994,426	138	1,997,172	137	2,050,972	143	2,125,090	6	74,118

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research

Major Changes in the Fiscal Year 2011 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 2011 budget request for NIGMS, which is \$74.118 million more than the FY 2010 estimate, for a total of \$2,125.090 million.

Research Project Grants (+\$25.947 million; total \$1,417.833 million): NIGMS will continue to maintain an adequate number of competing RPGs—1,002 awards in FY 2011, an increase of 88 awards over FY 2010. About 2,754 noncompeting RPGs awards, totaling \$1,025.533 million also will be made in FY 2011. The NIH budget policy for RPGs in FY 2011 is to provide for a 2% inflationary increase in noncompeting awards and a 2% increase in average cost for competing RPGs.

Research and Development Contracts (+\$23.862 million; total \$55.392 million): NIGMS will support in FY2011 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/Centers. Additional support will also be provided for the Therapies for Rare and Neglected Diseases Program and the NIH Basic Behavioral and Social Science Research Opportunity Network (OppNet).

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences
Summary of Changes

FY 2010 estimate		\$2,050,972,000	
FY 2011 estimated budget authority		2,125,090,000	
Net change		74,118,000	
CHANGES	2010 Current		
	Enacted Base	Change from Base	
	Budget		Budget
	Authority	FTEs	Authority
FTEs			
A. Built-in:			
1. Intramural research:			
a. Annualization of January 2010 pay increase			
	\$1,306,000		\$8,000
b. January FY 2011 pay increase			
	1,306,000		14,000
c. Zero less days of pay (n/a for 2011)			
	1,306,000		0
d. Payment for centrally furnished services			
	156,000		3,000
e. Increased cost of laboratory supplies, materials, and other expenses			
	1,154,000		18,000
Subtotal			43,000
2. Research management and support:			
a. Annualization of January 2010 pay increase			
	\$19,519,000		\$118,000
b. January FY 2011 pay increase			
	19,519,000		205,000
c. Zero less days of pay (n/a for 2011)			
	19,519,000		0
d. Payment for centrally furnished services			
	14,075,000		282,000
e. Increased cost of laboratory supplies, materials, and other expenses			
	23,024,000		397,000
Subtotal			1,002,000
Subtotal, Built-in			1,045,000

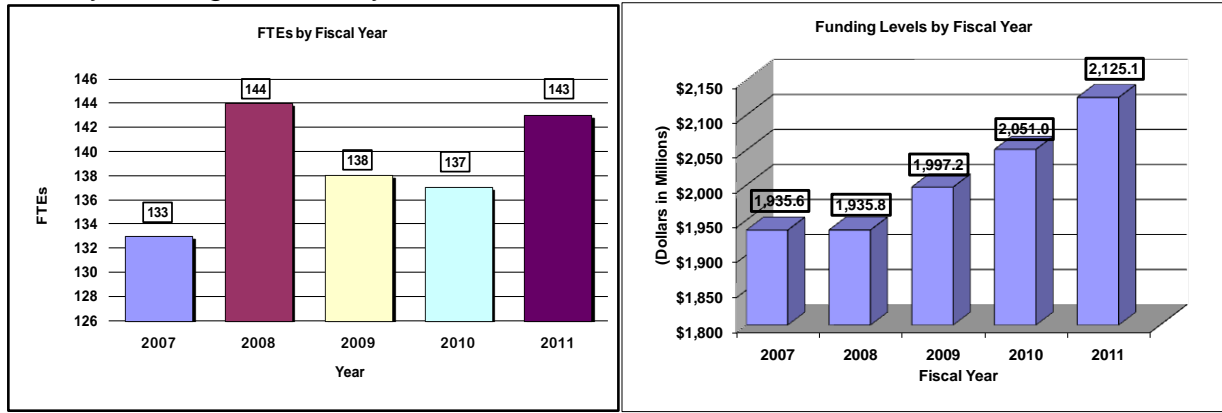
**NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences**

Summary of Changes--continued

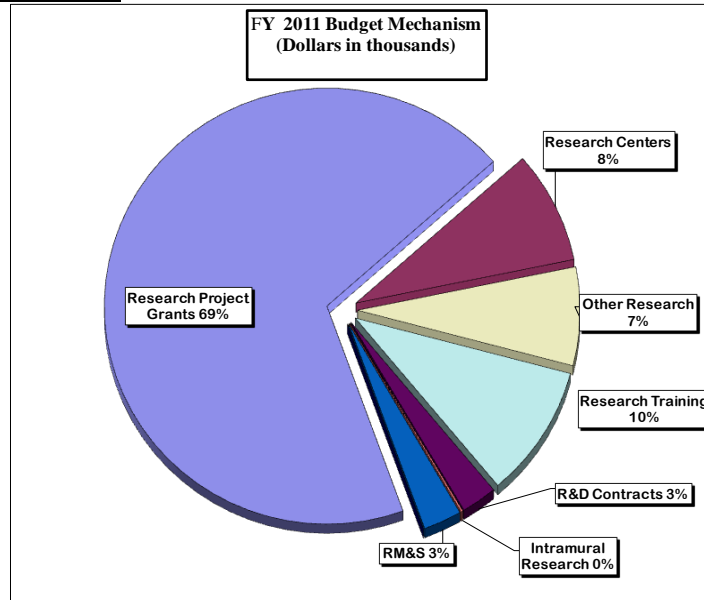
CHANGES	2010 Current Enacted Base		Change from Base	
	No.	Amount	No.	Amount
B. Program:				
1. Research project grants:				
a. Noncompeting	2,865	\$1,059,465,000	(111)	(\$13,532,000)
b. Competing	914	332,421,000	88	39,479,000
c. SBIR/STTR	148	48,414,000	2	59,000
Total	3,927	1,440,300,000	(21)	26,006,000
2. Research centers	50	172,090,000	3	5,163,000
3. Other research	594	150,261,000	30	4,508,000
4. Research training	4,321	197,557,000	0	11,664,000
5. Research and development contracts	29	31,530,000	1	23,862,000
Subtotal, extramural				71,203,000
	<u>FTEs</u>		<u>FTEs</u>	
6. Intramural research	10	2,616,000	1	41,000
7. Research management and support	127	56,618,000	5	1,829,000
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program		2,050,972,000		73,073,000
Total changes	137		6	74,118,000

Fiscal Year 2011 Budget Graphs

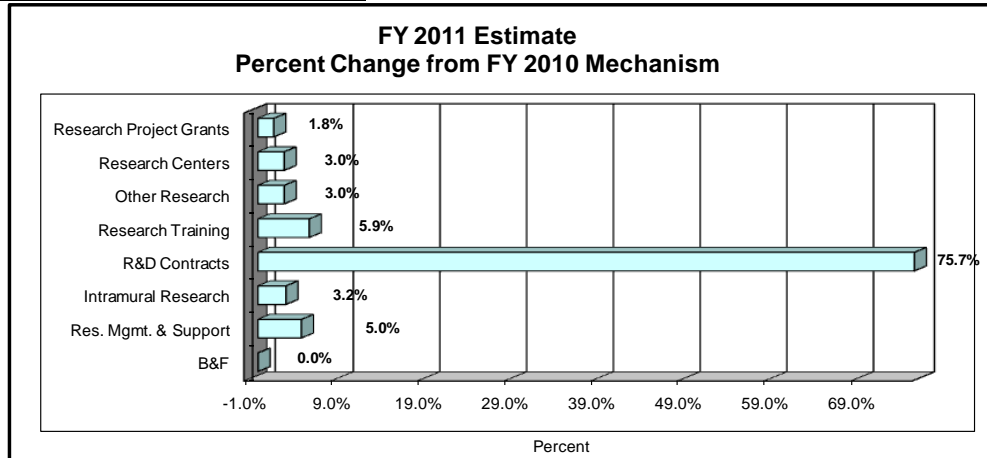
History of Budget Authority and FTEs:



Distribution by Mechanism:



Change by Selected Mechanisms:



Justification

National Institute of General Medical Sciences

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

Budget Authority:

	FY 2009 <u>Actual</u>	FY 2010 <u>Enacted</u>	FY 2011 <u>President's Budget</u>	FY 2011 +/- <u>FY 2010</u>
<u>BA</u>	\$1,997,172,000	\$2,050,972,000	\$2,125,090,000	\$74,118,000
<u>FTE</u>	138	137	143	6

This document provides justification for the Fiscal Year (FY) 2011 activities of the National Institute of General Medical Sciences (NIGMS), including HIV/AIDS activities. Details of the FY 2011 HIV/AIDS activities are in the "Office of AIDS Research (OAR)" Section of the Overview. Details on the Common Fund are located in the Overview, Volume One. Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

DIRECTOR'S OVERVIEW

The fundamental biomedical and behavioral research supported by the National Institute of General Medical Sciences (NIGMS) canvasses a wide spectrum, ranging from experiments with organisms, cells, genes and molecules to studies of systems biology that examine the behavior of interconnected networks. Advances in each of these areas have propelled progress for the treatment, diagnosis and prevention of diseases like cancer, diabetes, infections and many others. This past year's Nobel prizes offer compelling proof that curiosity-driven basic research pays unexpected dividends.

The 2009 Nobel Prize in Physiology or Medicine went to three American scientists for their discoveries about telomeres—the "shoelace tips" that guard and protect the ends of each of our chromosomes. All long-time NIGMS grantees, these researchers were honored for their seminal work that has implications for cellular aging, cancer and other health issues. Cancer cells that divide endlessly, for example, appear to have an enhanced ability to renew their telomeres. Clinical trials are underway to test vaccines directed against cells with very active telomerase, the enzyme that makes and preserves telomeres and to test inhibitors of telomerase. Other studies are ongoing to understand the role of telomerase in certain forms of congenital aplastic anemia and other inherited diseases of the skin and the lungs that are caused by defective telomerase.

The 2009 Nobel Prize in Chemistry honored studies of a process that is vital for the health of every cell in the body: translating the DNA code into life. NIGMS funded all three of the awardees for decades as they painstakingly worked out the details of this difficult problem. Their experiments have explained—atom-by-atom—how cellular factories called ribosomes produce proteins. In recent work, these scientists have examined structures that illustrate how different antibiotics bind to ribosomes.

Solving the Structures of Life

NIGMS-funded research continues to clarify the still-not-understood language written in our genes, bringing our society ever closer to the time when personalized medicine will be routine. That means that we as individuals will know ahead of time how we are likely to react to a medicine.

A recent NIGMS-funded study found a gene variant (an altered DNA spelling) that predicts clinical outcome in women with breast cancer taking the drug tamoxifen. In addition to deepening knowledge about the natural course of disease, steady progress in the field of pharmacogenomics is leading to safer and more effective medicines. For example, this past year, researchers funded by the NIGMS-led NIH Pharmacogenetics Research Network discovered a new, gene-based method to help doctors determine a patient's optimal dose of the blood thinner warfarin. Another study reported that a gene variant carried by about a third of the population plays a major role in this group's response to a different anti-clotting medicine, clopidogrel (Plavix[®]). Despite its widespread use, up to a third of people do not respond to clopidogrel and as a result, experience serious cardiovascular events as a result of inadequate drug therapy.

Collectively, research results in this important area of biomedicine are prompting the Food and Drug Administration to consider changing the labeling requirements for important medicines taken by millions of Americans. Currently, genetic tests are required, recommended or mentioned for 14 drugs to treat a range of conditions including HIV/AIDS, cancer, seizures and cardiovascular disorders. Pharmacogenomics will undoubtedly become a very compelling aspect of medical practice, and along the way it will likely play a role in health care reform.

Dovetailing with this progress in genetics and genomics is an increased understanding of proteins. Researchers have made important gains in understanding how a protein's three-dimensional shape determines its function—or lack of function—in disease. Over the last two years, NIGMS grantees overcame monumental technical hurdles in solving the structures of human G protein-coupled receptors. This group of proteins is quite challenging to study in detail but is extremely important from a medical standpoint since these proteins control critical bodily functions, several of our senses, and the action of about half of today's medicines.

The Many Faces of Science

A recent report¹ issued by the National Research Council of the National Academy of Sciences calls for a broad acceptance of the necessity of recognizing and introducing a “new biology” in modern areas of science including biomedicine. The report details an approach to research in which physicists, chemists, computer scientists, engineers, mathematicians and other researchers are integrated into the field of biology to create the type of research community that can tackle society's big problems. I am pleased to say that NIGMS has been pursuing interdisciplinary solutions to biomedical problems for many years.

A cornerstone of the NIGMS mission is preparing for the future by supporting the research training of the next generation of biomedical and behavioral researchers who will form those teams. We are keenly attuned to challenges in this area, in particular to an imbalance in representation of women and minorities in science careers. As biomedicine continues to evolve, it is essential that we periodically go back to basics to define--clearly and functionally--the fundamental goals of research training. NIGMS has recently led an NIH-wide effort to support social science research addressing factors that help foster women's careers in science. Furthermore, the Institute is embarking on a strategic plan for research training that will garner evidence and input from the scientific community and prioritize the steps necessary to create and sustain a healthy and productive research training environment that mirrors the composition of the United States. We envision that the results of this process will be far-reaching and will help inform NIH-wide policy in this area.

Overall Budget Policy: The FY 2011 request for NIGMS is \$2,125.090 million, an increase of \$74.118 million or +3.6 percent over the FY 2010 enacted level.

Investigator-initiated research projects and early career investigator research are the Institute's highest priorities. NIGMS will continue to support new investigators and to maintain an adequate number of competing RPGs. Developing a strong scientific workforce is a core element of the NIGMS mission. In FY 2011, NIGMS will support new investigators on R01 equivalent awards at success rates equivalent to those of established investigators submitting new R01 equivalent applications. In addition to our research funding activities, we support this goal through a range of training programs.

In FY 2011, NIGMS also plans to emphasize support of genomics and other high-throughput technologies, translational medicine, benefitting healthcare reform, and reinvigorating the biomedical workforce. Intramural Research and Research Management and Support receive modest increases to help offset the cost of pay and other increases.

Funds are included in R&D contracts to support several trans-NIH initiatives, such as the Therapies for Rare and Neglected Diseases program (TRND), the Basic Behavioral

¹ A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution. http://www.nap.edu/catalog.php?record_id=12764#toc Accessed September 21, 2009

and Social Sciences Opportunity Network (OppNet), and support for a new synchrotron at the Brookhaven National Laboratory, as well as increased support for other HHS agencies through the program evaluation set-aside.

FY 2011 Justification by Activity Detail

Overall Budget Policy:

Program Descriptions and Accomplishments

Cell Biology and Biophysics: The Cell Biology and Biophysics (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 many other novel imaging techniques, have facilitated our understanding of life at the level of molecules and atoms. This basic research promotes the development of precise, targeted therapies and diagnostics for a range of diseases. In FY 2009, the program's Protein Structure Initiative (PSI) continued to make protein structure determination faster, easier, and cheaper, while contributing to our basic understanding of the relationship between gene sequence and protein structure. In FY 2010, the PSI will enter a new phase of funding that will extend to FY 2014. This third phase, PSI:Biography, will make PSI resources available to the broad scientific community to solve a range of medically relevant problems while developing technology to tackle increasingly complex structures.

Budget Policy: The FY 2011 budget estimate for this program is \$597.763 million, an increase of \$19.350 million and 3 percent over the FY 2010 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 2011, CBB will continue to support the Protein Structure Initiative (PSI), a project that began in FY 2000 that aims to make protein structure determination a rapid and inexpensive enterprise. CBB will also use FY 2011 funds to support programs in optical imaging and an AIDS-related structural biology program.

Program Portrait: EUREKA

FY 2010 level: \$11.8 million

FY 2011 level: \$12.1 million

Change: \$.3 million

For science to move forward in leaps rather than in incremental steps, researchers need opportunities to test unconventional, potentially paradigm-shifting ideas. They also need the freedom to try innovative, often risky approaches to solve difficult problems that impede progress. However, applications proposing such research have faced problems in review because they are difficult to evaluate in comparison to more typical investigator-initiated R01 research grant applications that emphasize feasibility over novelty. To address this issue, in 2007 NIGMS developed a new program, EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration). The program has been popular across NIH: The most recent EUREKA re-announcement for funding in FY 2010 involved eight additional NIH Institutes and was the model for an NIH Roadmap Transformative R01 initiative and for an NIAID initiative for innovative approaches to development of effective therapies

for AIDS. EUREKA grew from the innovative efforts of NIGMS staff members who recognized that the Institute's "high-risk/high-reward" R21 grant program was not achieving its goals: Both applicants and NIH staff had become confused about the goals of the R21 program. Reviewers, in particular, found it difficult to fairly assess "special purpose" applications alongside standard R01 and R21 grants. Thus, EUREKA was designed with several innovative features. First, applicants must explicitly describe the potential impact of the proposed research, in terms of both the size of the scientific community affected and the magnitude of its impact on that community.

Second, the format of the eight-page EUREKA application is unique in that it discourages undue focus on details of experimental design and has a streamlined biosketch that lists only those publications that demonstrate innovation and the applicant's ability to solve difficult problems. Third, reviewers are told explicitly to focus their evaluation on innovation and significance and to disregard risk unless there is absolutely no likelihood that the project will succeed. To assure a more even review, EUREKA applications are compared only with each other, not with other grant types.

From its inception, the EUREKA program has been popular with the scientific community. In FY 2009, NIGMS staff responded to thousands of inquiries about EUREKA and received almost 150 applications, 19 of which were funded. Although it is too early to evaluate the EUREKA program's ability to un-block scientific progress, the initiative is clearly fulfilling a key goal of giving investigators the opportunity to pursue potentially ground-breaking research projects that are inherently risky in idea or approach.

Genetics and Developmental Biology: The mission of the Genetics and Developmental Biology (GDB) program is to promote basic research that aims to understand fundamental mechanisms of inheritance and development. This research underlies more targeted projects supported by other NIH institutes and centers. Much of GDB's investigator-initiated research is performed in model organisms, an approach that continues to deepen our understanding of common diseases and diverse behaviors. In FY 2009, GDB supported research on the basic biology of embryonic stem cells by funding five program project grants. Furthermore, to rapidly exploit the potential of induced pluripotent stem (iPS) cell research, GDB funded administrative supplements to 30 NIGMS grantees wishing to extend their ongoing projects by using iPS cells as models to study differentiation, development and genetic reprogramming. In FY 2009, GDB also funded three new grants in response to an RFA to investigate systems-based approaches for understanding how genes that contribute to common diseases interact with each other and with external influences to bring about their effects. In FY 2010, GDB will continue this initiative and, to complement the NIH Roadmap's initiative to sequence the human microbiome, GDB will fund new grants that seek to understand the basic principles and mechanisms that govern the symbiotic systems dynamics of microbial communities.

Budget Policy: The FY 2011 budget estimate for this program is \$548.546 million, an increase of \$17.756 million and 3 percent over the FY 2010 Enacted level. As with FY 2010, most GDB expenditures will support individual investigators seeking fundamental knowledge about life processes. In FY 2011, GDB will continue to support an initiative to fund systems-based approaches for understanding how genes that contribute to common diseases interact with each other and with external influences to bring about their effects.

Program Portrait: Induced Pluripotent Stem (iPS) Cells—Grant Supplements

FY 2010 level: \$0

FY 2011 level: \$802 thousand

Change: \$802 thousand

One of the most fundamental questions in biology is how a single egg and sperm combine to form an embryo that will eventually develop into a complex human being composed of thousands of distinct cell types. An equally important and medically relevant question is whether this process is reversible. Can adult cells of a specific tissue type be reprogrammed to once again become capable of becoming any cell type in the body? With the discovery in 1999 that human embryonic stem cells could be maintained in laboratory culture, scientists could for the first time study how “pluripotent” stem cells mature into specific cell types. This basic knowledge laid the foundation for the subsequent discovery, in 2007, that adult skin cells could be reprogrammed to become pluripotent stem (iPS) cells, which appear remarkably similar to human embryonic stem cells. In addition to gaining a fundamental understanding of this most basic of biological processes, pluripotent stem cell research may lead to stem cell therapies to replace or repair damaged tissues and to treat degenerative conditions, such as diabetes and Alzheimer’s disease. To rapidly take advantage of this new scientific opportunity, NIGMS announced its intent in 2008 to supplement NIGMS-funded researchers’ grants with funds to enable these scientists to extend their research to include iPS cells. This supplement program gives grantees the chance to focus their ongoing work on improving methods for deriving iPS cells; clarifying the molecular, cellular, and genetic properties of iPS cells; and evaluating the cells’ use in screening drugs and bioactive molecules. In response to the Institute’s initiative, NIGMS funded 30 supplements in FY 2009. Five of these went to scientific teams, or program project awards, pursuing the basic biology of human embryonic stem cells. NIGMS recently held its third Workshop on Human Embryonic Stem Cell Research at which many grantees presented their most recent work on both human embryonic stem cells and iPS cells. The presentations demonstrated that this is a rapidly moving area of study poised to lead to important new scientific insights and therapeutic strategies.

Pharmacology, Physiology, and Biological Chemistry: The mission of the Pharmacology, Physiology, and Biological Chemistry (PPBC) program is to support fundamental research in chemistry, biochemistry, pharmacology, and physiology that contributes to understanding human biology in health and disease, and that generates knowledge for new diagnostics and therapeutics. PPBC funds the development of new chemistry, understanding of biochemical processes, and the discovery of new pharmacological principles. 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, and anesthesia. In FY 2009, the Global Alliance for Pharmacogenomics (a partnership between NIH and the Center for Genomic Medicine in Japan) added ten new studies to the Pharmacogenetics Research Network-led consortium of research groups that study how genes affect an individual’s response to medicines. The Metabolic Engineering funding initiative, a Federal interagency program, supports research aimed at using living systems to produce useful quantities of substances such as medicines and other health products. In FY 2009, PPBC expanded its effort to develop new methods for the synthesis of carbohydrate molecules and rapidly expand their chemical space.

Budget Policy: The FY 2011 budget estimate for this program is \$441,023 million, an increase of \$14.276 million and 3 percent over the FY 2010 Enacted level. PPBC will continue to emphasize the support of investigator-initiated research grants. In FY 2011,

the Pharmacogenetics Research Network, which is working toward promoting the goal of personalized medicine, will advance with the addition of genome-wide association studies through national and international collaborations.

Bioinformatics and Computational Biology: The Center for Bioinformatics and Computational Biology (CBCB) supports research that draws expertise from mathematics, statistics, computer science, engineering and physics to answer problems in biomedicine. CBCB emphasizes integrated, systems approaches that pair computational studies with laboratory-based investigations. Other projects create virtual laboratories that address questions difficult to tackle in the laboratory. CBCB also encourages the development of tools and techniques to acquire, store, analyze and visualize data. In FY 2009, CBCB funded one new National Center for Systems Biology to advance the study of the complexity of biology and to train more scientists in this emerging field. This national effort, launched in 2002 and now totaling 11 centers, continues to broaden and enhance our understanding of the complex interactions between cells, tissues and organisms.

Budget Policy: The FY 2011 budget estimate for this program is \$122.371 million, an increase of \$3.962 million and 3 percent over the FY 2010 Enacted level. Highest priority will be given to investigator-initiated research, since this research will continue to yield information and tools for exploring complex biological systems. Two major initiatives employing FY 2011 funds are the Models of Infectious Disease Agent Study (MIDAS), which models the spread of infectious diseases, and the Centers for Systems Biology program, which currently funds 10 centers.

Minority Opportunities in Research The mission of the Minority Opportunities in Research (MORE) program is to increase the number of underrepresented minorities performing biomedical and behavioral research. Research support for faculty at minority-serving institutions is now offered at three different levels, dependent upon the applicant's level of development as a research scientist. Another major change is that these grants will now be administered by program officers across NIH who manage research in the scientific areas of the grants, rather than being administered solely by NIGMS staff. In FY 2009, MORE also funded a workshop grant to promote greater collaboration between biomedical and social scientists testing assumptions and hypotheses that undergird interventions for boosting careers in biomedical and behavioral research.

Budget Policy: The FY 2011 budget estimate for this program is \$144.017 million, an increase of \$4.195 million and 3 percent over the FY 2010 Enacted level. In FY 2011, NIGMS program staff will continue to reorganize existing programs to comply with recommendations issued from a working group of the NAGMS Council that advised the institute to rebalance its MORE portfolio. These efforts will place greater emphasis on student development and training. In FY 2011, MORE will also continue to examine the current state of research on interventions that influence the participation of underrepresented minorities in the biomedical and behavioral science.

Research Training: The Research Training program provides research training support for the next generation of biomedical and behavioral scientists. In addition to training Ph.D. and M.D.-Ph.D. students, the program supports postdoctoral fellows through advanced and specialized training in basic, translational and clinical research. This program also features 12 predoctoral institutional training grant areas (T32s), which provide broad-based, multidisciplinary research training in several areas of biomedicine. Independent of institutional training grant activities, the program also supports the training of students and fellows working in individual-investigator laboratories, as well as mentored career development awards in six clinically related areas. In FY 2009, the program continued its new T32 training grant in molecular medicine and made two new awards in its recently established institutional training grant to support basic behavioral scientists (now in its third year). Also in FY 2009, the program continued the Community for Advanced Graduate Training, a Web-based tool to facilitate interactions and recruitment efforts between the NIGMS Minority Access to Research Careers (MARC) programs and the Institute's predoctoral T32 programs. FY2009 saw the start of a new predoctoral fellowship for pharmacy students enrolled in a formally combined PharmD./PhD program in the biomedical, behavioral or clinical sciences.

Budget Policy: The FY 2011 budget estimate for this program is \$209.221 million, an increase of \$11.664 million and 5.9 percent above the FY 2010 Enacted level. Consistent with overall NIH policy, NIGMS will be providing a 6% stipend increase. Maintaining a healthy pipeline of researchers is critical to maintaining the vibrancy of the scientific enterprise. NIGMS will continue to support rigorous research training programs that foster intellectual creativity, learning of quantitative skills, and exposure to topics in human health. In FY 2011, NIGMS will continue its new program supporting the research training of basic behavioral scientists and will promote its new molecular medicine program.

Intramural: The Institute has a small, but unique, intramural research program that supports postdoctoral research fellows for up to three years each. The Pharmacology Research Associate (PRAT) program provides scientists who have backgrounds in the basic or clinical sciences with multidisciplinary training in how drugs interact with living systems. For scientists who are already well-versed in pharmacology, the program offers experience in new fields. A number of former program participants have gone on to distinguished careers in academia, industry and government, and one has won a Nobel Prize.

Budget Policy: The FY 2011 budget estimate for the Intramural Research program is \$2.7 million, an increase of \$84 thousand and 3.2 percent over the FY 2010 Enacted level. NIGMS will continue its PRAT program, which provides training for outstanding fellows who conduct research in intramural laboratories of other NIH institutes and centers or in Food and Drug Administration laboratories. After their NIH training, the 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.

Research Management and Support: NIGMS Research Management and Support (RMS) activities provide administrative, budgetary, logistical and scientific support in the review, award and monitoring of research grants, training awards, and research and development contracts. RMS functions also encompass strategic planning, coordination, and evaluation of the Institute's programs, regulatory compliance, international coordination and liaison with other Federal agencies, Congress and the public. To enhance the efficiency of grants administration functions, RMS funds continued to be used to develop and maintain an NIGMS information technology architecture that is integrated with NIH enterprise information systems. In FY 2010, RMS funds will be used to support scientific meetings, conferences and workshops to advance biomedical research. RMS funds will also continue to be used to support information technology tools to facilitate the peer review process, conduct portfolio analysis and assist with document management. In FY 2010, RMS funds will be used to develop formal disaster recovery plans for NIGMS' information technology infrastructure, including plans for dealing with sustaining mission-critical operations during a pandemic or other emergency. The Institute also plans to use RMS funds to convert over 80,000 legacy grant files to an electronic format ultimately resulting in enhancements to reporting capabilities.

Budget Policy: The FY 2011 budget estimate for RMS is \$59.449 million, an increase of \$2.831 million and 5.0 percent over the FY 2010 Enacted level. In FY 2011, RMS funds will continue to support meetings with the biomedical and behavioral research community that will assist NIGMS in assigning priorities and setting its research agenda. To enhance the efficiency of grants administration functions, FY 2011 RMS funds will develop and maintain an NIGMS information technology architecture that is integrated with NIH enterprise information systems. In FY 2011, NIGMS will also promote innovations in administration and management to minimize paperwork and administrative burden, such as a more robust Intranet that will align with NIH-wide enterprise architecture.

Recovery Act Implementation

Recovery Act Funding: \$505.188 million

In FY 2009, NIGMS received \$505.188 million under the Recovery Act. Of this amount, \$351.8 million was obligated in FY 2009 (nearly 1,600 awards) and \$153.4 million will be obligated in FY 2010. In keeping with the NIGMS mission to sustain basic biomedical research that is the engine of innovation, our primary consideration for funding is the quality of a proposed idea. However, because of the unique opportunity created by the Recovery Act, the Institute also considered two other factors: the economic stimulus impact of the funding and the distribution of funds across regions, states and institutions. Most NIGMS Recovery Act funds went to support administrative supplements for active individual investigator awards (R01s and R37s), and a smaller portion funded competitive revisions to current individual investigator awards as well as new, two-year R01 grants. The Institute funded 14 Grand Opportunity grants to scientists in 13 states. These awards will establish new databases, service centers or other resources that will be accessible to the entire scientific community, advancing biomedical research—and possibly medical care—for years to come. In addition, the NIGMS Recovery Act investment includes 19 Challenge Grants in 12 states, projects that focus on overcoming specific scientific and technological challenges in stem cells, molecular imaging, synthetic biology, drug discovery, green chemistry, behavioral research and research training. As a whole, NIGMS Recovery Act awards unleash pent-up creativity and innovation in laboratories in states across the nation, allowing scientists to explore important research questions while stimulating their local economies through job creation, training and purchasing of new equipment.

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

Budget Authority by Object

	FY 2010 Enacted	FY 2011 PB	Increase or Decrease	Percent Change
Total compensable workyears:				
Full-time employment	137	143	6	4.4
Full-time equivalent of overtime and holiday hours	1	1	0	0.0
Average ES salary	\$0	\$0	\$0	0.0
Average GM/GS grade	12.7	12.7	0.0	0.0
Average GM/GS salary	\$107,949	\$109,748	\$1,799	1.7
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$0	\$0	\$0	0.0
Average salary of ungraded positions	139,683	142,011	2,328	1.7
OBJECT CLASSES	FY 2010 Estimate	FY 2011 Estimate	Increase or Decrease	Percent Change
Personnel Compensation:				
11.1 Full-time permanent	\$9,951,000	\$10,513,000	\$562,000	5.6
11.3 Other than full-time permanent	6,005,000	6,383,000	378,000	6.3
11.5 Other personnel compensation	480,000	508,000	28,000	5.8
11.7 Military personnel	0	0	0	0.0
11.8 Special personnel services payments	281,000	313,000	32,000	11.4
Total, Personnel Compensation	16,717,000	17,717,000	1,000,000	6.0
12.0 Personnel benefits	4,108,000	4,352,000	244,000	5.9
12.2 Military personnel benefits	0	0	0	0.0
13.0 Benefits for former personnel	0	0	0	0.0
Subtotal, Pay Costs	20,825,000	22,069,000	1,244,000	6.0
21.0 Travel and transportation of persons	365,000	365,000	0	0.0
22.0 Transportation of things	77,000	77,000	0	0.0
23.1 Rental payments to GSA	0	0	0	0.0
23.2 Rental payments to others	0	0	0	0.0
23.3 Communications, utilities and miscellaneous charges	218,000	218,000	0	0.0
24.0 Printing and reproduction	286,000	286,000	0	0.0
25.1 Consulting services	395,000	450,000	55,000	13.9
25.2 Other services	7,365,000	8,471,000	1,106,000	15.0
25.3 Purchase of goods and services from government accounts	96,446,000	110,150,000	13,704,000	14.2
25.4 Operation and maintenance of facilities	22,000	22,000	0	0.0
25.5 Research and development contracts	8,483,000	19,151,000	10,668,000	125.8
25.6 Medical care	0	0	0	0.0
25.7 Operation and maintenance of equipment	147,000	147,000	0	0.0
25.8 Subsistence and support of persons	0	0	0	0.0
25.0 Subtotal, Other Contractual Services	112,858,000	138,391,000	25,533,000	22.6
26.0 Supplies and materials	91,000	91,000	0	0.0
31.0 Equipment	691,000	691,000	0	0.0
32.0 Land and structures	0	0	0	0.0
33.0 Investments and loans	0	0	0	0.0
41.0 Grants, subsidies and contributions	1,915,561,000	1,962,902,000	47,341,000	2.5
42.0 Insurance claims and indemnities	0	0	0	0.0
43.0 Interest and dividends	0	0	0	0.0
44.0 Refunds	0	0	0	0.0
Subtotal, Non-Pay Costs	2,030,147,000	2,103,021,000	72,874,000	3.6
Total Budget Authority by Object	2,050,972,000	2,125,090,000	74,118,000	3.6

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research

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

Salaries and Expenses

OBJECT CLASSES	FY 2010 Enacted	FY 2011 PB	Increase or Decrease
Personnel Compensation:			
Full-time permanent (11.1)	\$9,951,000	\$10,513,000	\$562,000
Other than full-time permanent (11.3)	6,005,000	6,383,000	378,000
Other personnel compensation (11.5)	480,000	508,000	28,000
Military personnel (11.7)	0	0	0
Special personnel services payments (11.8)	281,000	313,000	32,000
Total Personnel Compensation (11.9)	16,717,000	17,717,000	1,000,000
Civilian personnel benefits (12.1)	4,108,000	4,352,000	244,000
Military personnel benefits (12.2)	0	0	0
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	20,825,000	22,069,000	1,244,000
Travel (21.0)	365,000	365,000	0
Transportation of things (22.0)	77,000	77,000	0
Rental payments to others (23.2)	0	0	0
Communications, utilities and miscellaneous charges (23.3)	218,000	218,000	0
Printing and reproduction (24.0)	286,000	286,000	0
Other Contractual Services:			
Advisory and assistance services (25.1)	395,000	450,000	55,000
Other services (25.2)	7,365,000	8,471,000	1,106,000
Purchases from government accounts (25.3)	29,406,000	30,748,000	1,342,000
Operation and maintenance of facilities (25.4)	22,000	22,000	0
Operation and maintenance of equipment (25.7)	147,000	147,000	0
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	37,335,000	39,838,000	2,503,000
Supplies and materials (26.0)	91,000	91,000	0
Subtotal, Non-Pay Costs	38,372,000	40,875,000	2,503,000
Total, Administrative Costs	59,197,000	62,944,000	3,747,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2010 Amount Authorized	FY 2010 Estimate	2011 Amount Authorized	FY 2011 PB
Research and Investigation	Section 301	42§241	Indefinite	\$2,050,972,000	Indefinite	\$2,125,090,000
National Institute of General Medical Sciences	Section 402(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				2,050,972,000		2,125,090,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2002	1,720,206,000	1,706,968,000	1,753,465,000	1,725,263,000
Rescission				(124,000)
2003	1,874,243,000	1,874,243,000	1,853,584,000	1,859,084,000
Rescission				(12,084,000)
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			

1/ Reflects enacted supplementals, rescissions, and reappropriations.

2/ Excludes funds for HIV/AIDS research activities consolidated in the NIH Office of AIDS Research.

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

Details of Full-Time Equivalent Employment (FTEs)

OFFICE/DIVISION	FY 2009 Actual	FY 2010 Enacted	FY 2011 PB
Office of the Director	12	12	12
Office of Scientific Review	12	12	13
Office of Administrative Management	23	23	23
Division of Extramural Activities	36	35	37
Division of Genetic and Developmental Biology	10	10	11
Division of Pharmacology, Physiology and Biological Chemistry	22	22	23
Division of Cell Biology and Biophysics	11	11	12
Center of Bioinformatics and Computational Biology	5	5	5
Division of Minority Opportunities in Research	7	7	7
Total	138	137	143
Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research			
FTEs supported by funds from Cooperative Research and Development Agreements			
	(0)	(0)	(0)
FISCAL YEAR	Average GM/GS Grade		
2007	12.5		
2008	12.5		
2009	12.7		
2010	12.7		
2011	12.7		

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

Detail of Positions

GRADE	FY 2009 Actual	FY 2010 Enacted	FY 2011 PB
Total, ES Positions	0	0	0
Total, ES Salary	0	0	0
GM/GS-15	14	14	15
GM/GS-14	36	36	37
GM/GS-13	25	24	24
GS-12	13	13	13
GS-11	10	10	10
GS-10	0	0	0
GS-9	9	9	11
GS-8	4	4	4
GS-7	0	0	0
GS-6	0	0	0
GS-5	1	1	1
GS-4	0	0	0
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	112	111	115
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	50	50	51
Total permanent positions	108	107	112
Total positions, end of year	162	162	167
Total full-time equivalent (FTE) employment, end of year	138	137	143
Average ES salary	0	0	0
Average GM/GS grade	12.7	12.7	12.7
Average GM/GS salary	104,845	107,949	109,748

Includes FTEs which are reimbursed from the NIH Roadmap for Medical Research.

New Positions Requested

	FY 2011		
	Grade	Number	Annual Salary
Health Science Administrator	GS-15	1	\$122,831
Health Science Administrator	GS-14	2	104,422
Intramural Research Fellow	AD-00	1	68,418
Grants Management Specialist	GS-9	2	51,243
Total Requested		6	\$346,914