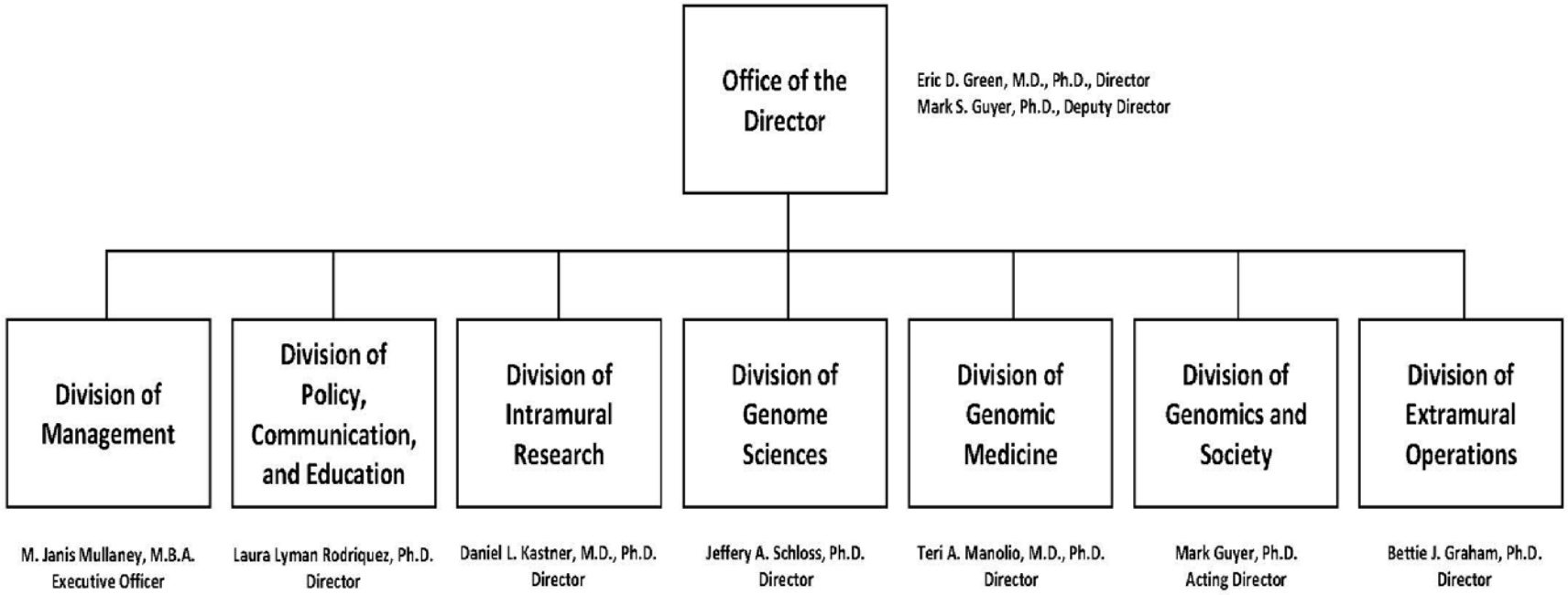
DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Human Genome Research Institute (NHGRI)

NATIONAL GENOME RESEARCH INSTITUTE

Organizational Structure



NATIONAL INSTITUTES OF HEALTH

National Human Genome Research Institute

For carrying out section 301 and title IV of the PHS Act with respect to human genome research, $517,319,000.

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

Amounts Available for Obligation [1]
(Dollars in Thousands)

Source of Funding	FY 2012 Actual	FY 2013 CR	FY 2014 PB
Appropriation	513,844	516,012	517,319
Rescission	(971)	0	0
Subtotal, adjusted appropriation	512,873	516,012	517,319
Secretary's Transfer for Alzheimer's disease (AD)	0	0	0
Secretary's Transfer for AIDS authorized by PL 112-74, Section 206	(146)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(469)	(606)	0
Subtotal, adjusted budget authority	512,258	515,406	517,319
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	512,258	515,406	517,319
Unobligated balance lapsing	(27)	0	0
Total obligations	512,231	515,406	517,319

[1] Excludes the following amounts for reimbursable activities carried out by this account:
FY 2012 - $23,062 FY 2013 - $35,062 FY 2014 - $35,062
Excludes $122 in FY 2012, $116 in FY 2013, and $218 in FY 2014 royalties.

National Human Genome Research Institute

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								
Research Projects								
Noncompeting	151	$79,050	159	$89,104	185	$103,666	34	$24,616
Administrative Supplements	*(42)*	12,846	*(18)*	5,641	*(18)*	5,879	*-(24)*	-6,967
Competing:								
Renewal	8	6,561	12	6,358	7	5,858	-1	-703
New	82	39,859	77	39,658	80	38,592	-2	-1,267
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	90	$46,420	89	$46,016	87	$44,450	-3	-$1,970
Subtotal, RPGs	241	$138,316	248	$140,761	272	$153,995	31	$15,679
SBIR/STTR	26	11,315	26	11,838	25	12,415	-1	1,100
Research Project Grants	267	$149,631	274	$152,599	297	$166,410	30	$16,779
Research Centers								
Specialized/Comprehensive	32	155,667	32	129,613	24	141,941	-8	-13,726
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	19	47,778	19	45,618	17	42,276	-2	-5,502
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	51	$203,445	51	$175,231	41	$184,217	-10	-$19,228
Other Research								
Research Careers	9	1,017	8	908	3	909	-6	-108
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	0	0	0	0	0	0	0	0
Other	20	2,312	47	30,178	29	5,828	9	3,516
Other Research	29	$3,329	55	$31,086	32	$6,737	3	$3,408
Total Research Grants	347	$356,405	380	$358,916	370	$357,364	23	$959
Ruth L. Kirschstein Training Awards	FTTPs		FTTPs		FTTPs		FTTPs	
Individual	13	572	14	601	14	613	1	41
Institutional	166	7,833	194	9,149	196	9,230	30	1,397
Total Research Training	179	$8,405	208	$9,750	210	$9,843	31	$1,438
Research & Development Contracts	4	16,550	4	17,063	4	19,583	0	3,033
SBIR/STTR (non-add)	*(2)*	*(25)*	*(0)*	*(24)*	*(0)*	*(24)*	*-(2)*	*-(1)*
	FTEs		FTEs		FTEs		FTEs	
Intramural Research	250	106,485	250	103,730	250	104,407	0	-2,078
Research Management and Support	88	24,413	96	25,947	96	26,122	8	1,709
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NHGRI	338	$512,258	346	$515,406	346	$517,319	8	$5,061

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

Major Changes in Fiscal Year 2014 President's Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that there may be overlap between budget mechanism and activity detail and these highlights will not sum to the total change for the FY 2014 President's Budget request for NHGRI, which is $5.1 million more than the FY 2012 level, for a total of $517.3 million.

Understanding the Structure of Genomes (-$11.805 million; total $28.316 million): For several years, NHGRI has been decreasing its investment in this area, as knowledge about the structure of genomes has improved and as the cost of generating data for studying the structure of genomes has dropped (because of improvements in the technologies for sequencing DNA). This shift in priority is consistent with the vision laid out by NHGRI in its 2011 strategic plan for the field of genomics.

Understanding the Biology of Genomes (-$12.539 million; total $89.442 million): For the past several years, NHGRI's major investment in this strategic area has been the ENCODE (ENCyclopedia Of DNA Elements) Project. ENCODE has been implemented in a phased manner, with transition from the highly successful Phase II to the new Phase III occurring in FY 2012. With the success of ENCODE to date and the ability to generate ENCODE data at lower costs than previously due to technology improvements, NHGRI decided to decrease slightly its activity in this area. This allowed resources to be reallocated towards other strategic research areas for NHGRI and the field of genomics, in particular those aiming to introduce genomics into medical practice.

Using Genomics to Understand the Biology of Disease (+$10.76 million; total $158.935 million): This increase in resources for using genomics to understand the biology of disease represents NHGRI's ongoing shift toward the support of research areas that use genomic tools to study the biological basis of disease. Such disease-oriented genomic studies are essential for achieving the Institute's longer-term objective of advancing human health through genomics research.

Education and Training (+$7.036 million; total $28.474 million): NHGRI is in the process of better aligning its genomics-oriented education and training programs with the Institute's long-term strategic vision for the field of genomics. The change in funding is thus a result of expanding our training and education programs in areas of particular need, such as bioinformatics/computational biology and genomic medicine.

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute
Summary of Changes
(Dollars in Thousands)

FY 2012 Actual				**$512,258**
FY 2014 President's Budget				**$517,319**
Net change				**$5,061**
	2014 President's Budget		**Change from FY 2012**	
CHANGES	**FTEs**	**Budget Authority**	**FTEs**	**Budget Authority**
A. Built-in:				
1. Intramural Research:				
a. Annualization of March 2013 pay increase & benefits		$37,027		$98
b. January FY 2014 pay increase & benefits		37,027		271
c. One more day of pay		37,027		140
d. Differences attributable to change in FTE		37,027		0
e. Payment for centrally furnished services		18,061		324
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		49,319		149
Subtotal				$982
2. Research Management and Support:				
a. Annualization of March 2013 pay increase & benefits		$12,193		$38
b. January FY 2014 pay increase & benefits		12,193		90
c. One more day of pay		12,193		46
d. Differences attributable to change in FTE		12,193		0
e. Payment for centrally furnished services		510		10
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		13,419		3
Subtotal				$187
Subtotal, Built-in				$1,169

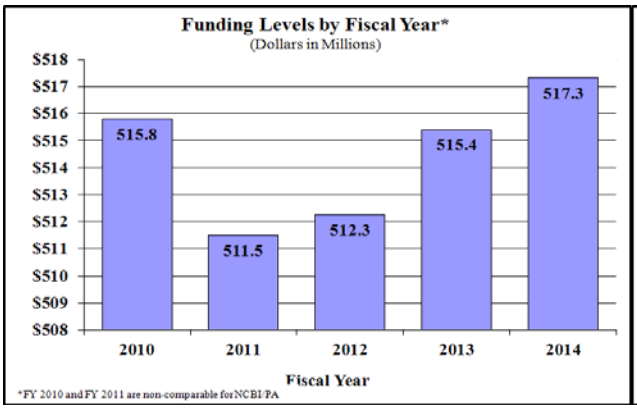
NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

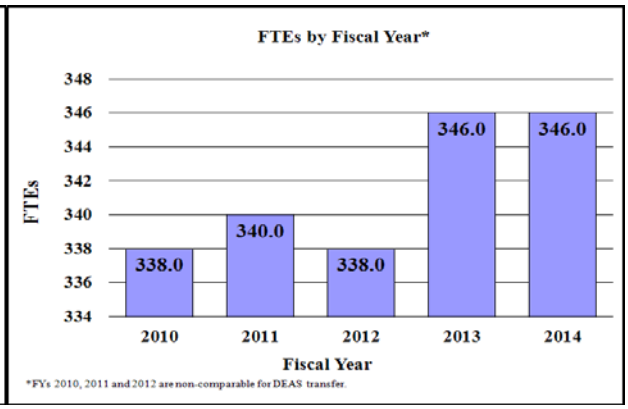
Summary of Changes--continued

CHANGES	2014 President's Budget No.	2014 President's Budget Amount	Change from FY 2012 No.	Change from FY 2012 Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	185	$109,545	34	$17,649
b. Competing	87	44,450	-3	-1,970
c. SBIR/STTR	25	12,415	-1	1,100
Total	297	$166,410	30	$16,779
2. Research Centers	41	$184,217	-10	-$19,228
3. Other Research	32	6,737	3	3,408
4. Research Training	210	9,843	31	1,438
5. Research and development contracts	4	19,583	0	3,033
Subtotal, Extramural		$386,790		$5,430
	FTEs		FTEs	
6. Intramural Research	250	$104,407	0	-$3,060
7. Research Management and Support	96	26,122	8	1,522
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, program	346	$517,319	8	$3,892
Total changes				$5,061

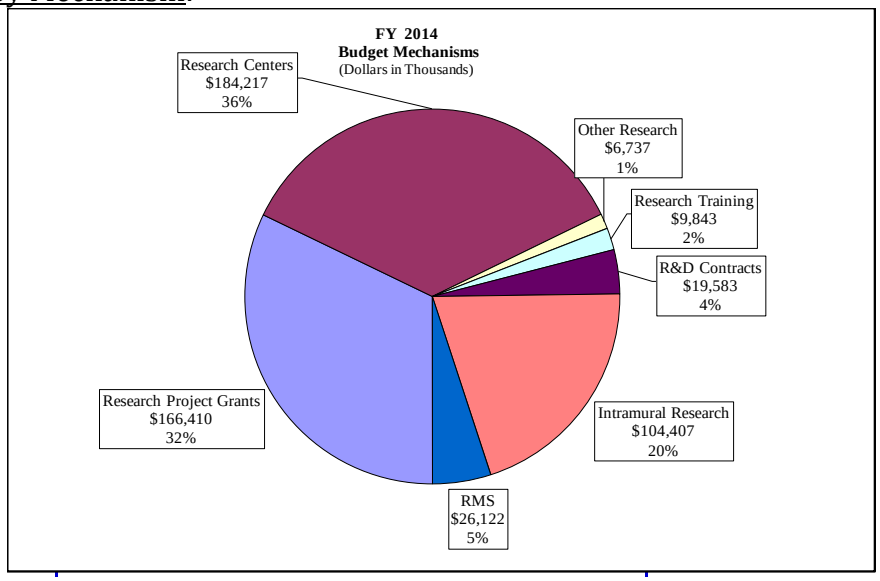
Fiscal Year 2014 Budget Graphs

History of Budget Authority and FTEs:

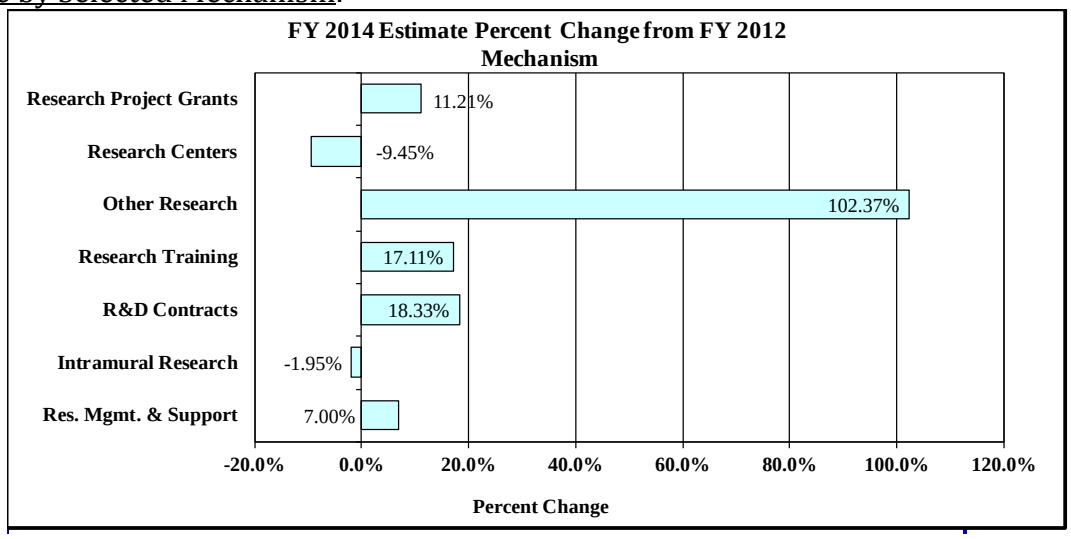




Distribution by Mechanism:



Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute
Budget Authority by Activity [1, 2]
(Dollars in Thousands)

	FY 2012 Actual		FY 2013 CR		FY 2014 PB		Change vs. FY 2012	
Program Activity	**FTEs**	**Amount**	**FTEs**	**Amount**	**FTEs**	**Amount**	**FTEs**	**Amount**
Detail:								
Understanding the Structure of Genomes		$40,121		$28,228		$28,316		-$11,805
Understanding the Biology of Genomes		101,981		89,144		89,442		-12,539
Using Genomics to Understand the Biology of Disease		148,175		158,361		158,935		10,760
Using Genomics to Advance Medical Science		29,034		33,631		33,784		4,750
Using Genomics to Improve the Effectiveness of Healthcare		9,603		13,104		13,164		3,561
Bioinformatics and Computational Biology		108,533		109,663		110,012		1,479
Education and Training		21,438		28,361		28,474		7,036
Genomics and Society		28,960		28,967		29,070		110
Subtotal, Program Activity*		$487,845		$489,459		$491,197		$3,352
Extramural Research (non-add)		*$381,360*		*$385,729*		*$386,790*		*$5,430*
Intramural Research(non-add)	250	*$106,485*	250	*$103,730*	250	*$104,407*	0	*-$2,078*
Research Management & Support	88	$24,413	96	$25,947	96	$26,122	8	$1,709
TOTAL	338	$512,258	346	$515,406	346	$517,319	8	$5,061

[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.
* The detail programs listed above include both extramural and intramural funding.

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

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	$515,406,000	Indefinite	$517,319,000
National Human Genome Research Institute	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$515,406,000		$517,319,000

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2005	$492,670,000	$492,670,000	$496,400,000	$492,670,000
Rescission				($4,062,000)
2006	$490,959,000	$490,959,000	$502,804,000	$490,959,000
Rescission				($4,910,000)
2007	$482,942,000	$482,942,000	$486,315,000	$486,491,000
Rescission				-
2008	$484,436,000	$493,996,000	$497,031,000	$495,434,000
Rescission				($8,655,000)
Supplemental				$2,589,000
2009	$487,878,000	$504,603,000	$501,411,000	$502,367,000
Rescission				-
2010	$509,594,000	$520,311,000	$511,007,000	$516,028,000
Rescission				-
2011	$533,959,000	-	$533,127,000	$516,028,000
Rescission				($4,531,033)
2012	$524,807,000	$524,807,000	$505,738,000	$513,844,000
Rescission				($971,165)
2013	$511,370,000	-	$512,920,000	-
Rescission				-
2014	$517,319,000	-	-	-

Justification of Budget Request

National Human Genome Research Institute

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	$512,258,000	$515,406,000	$517,319,000	+$5,061,000
FTE	338	346	346	+8

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

Director's Overview

In the decade since the completion of the Human Genome Project (HGP), genomics has become central to biomedical research, with remarkable genomic accomplishments seen across myriad disciplines. The research funded by the National Human Genome Research Institute (NHGRI) has catalyzed a transformation in how biomedical science is conducted, and genomic tools and strategies are now advancing toward clinical integration and the realization of genomic medicine. Genomic analyses increasingly shed light on fundamental knowledge about biology and its perturbation in disease. NHGRI's leadership in high-throughput strategies and technology development continues to stimulate progress and innovation in basic and translational research, which in turn will enable the breakthroughs that will improve health outcomes for the nation.

In February 2011, NHGRI published a new strategic vision for genomics research.[1] This updated vision articulates five research domains that together comprise a progressive continuum leading to the realization of genomics-informed medicine, namely *understanding the structure of genomes*; *understanding the biology of genomes*; *understanding the biology of disease*; *advancing the science of medicine*; and *improving the effectiveness of healthcare*. To align its organizational components most effectively with current scientific opportunities, NHGRI recently reorganized its Extramural Research Program, establishing the following:

- Division of Genome Sciences
- Division of Genomic Medicine
- Division of Genomics and Society
- Division of Extramural Operations

[1] *http://www.genome.gov/Pages/About/Planning/2011NHGRIStrategicPlan.pdf*.

Through the collaborative management of the extramural research portfolio across these divisions, NHGRI will continue in Fiscal Year (FY) 2014 to build a foundation for future breakthroughs and to expand research activities within the more translational domains described in the strategic plan.

Genome Sciences: Previous and ongoing NHGRI investments in the development of innovative and more powerful methods for sequencing DNA, as well as in the refinement of existing technologies, are fueling a revolution in the biomedical sciences. Researchers can now generate extremely high-resolution genomic data about an individual, a population, or even a single cell. Importantly, technological advancements spearheaded by NHGRI leadership have resulted in a phenomenal decrease in the cost of sequencing a human genome (more than four orders of magnitude since 2001).[2] These decreases bring the type of genomic analyses once possible only in large-scale sequencing centers to research laboratories both large and small; they also make clinical genome sequencing applications closer to reality. Large specialized centers still have a vital role, both for training the next generation of genomics researchers and for refining genome-sequencing approaches and workflows that then get disseminated to the research community. The value of technology development is further complemented by bioinformatics tools and training modules that NHGRI-funded research programs are developing and making widely available.

Significant advances continue to be made in understanding the biology of genomes. In September 2012, NHGRI's ENCyclopedia Of DNA Elements (ENCODE) Project published a landmark series of papers, the culmination of more than 1,600 experiments. While protein-coding regions comprise less than two percent of the human genome, ENCODE results suggest that most of the rest of the genome serves a biological function. In FY 2014, ENCODE investigators will identify and characterize more of these important genomic regions. Since many of these elements contain DNA sequence variants previously linked to human disease, it is expected that future ENCODE data will help inform studies examining the clinical utility of genomic information.

Genomic Medicine: NHGRI-funded programs are using genomics to investigate common but genetically complex diseases that burden the health of the nation, such as asthma and diabetes. Scientists at the NHGRI's Genome Sequencing and Analysis Centers are investigating the genomic basis for conditions such as cardiovascular disease and Alzheimer's disease, while multidisciplinary teams of clinicians, genomicists, bioinformaticians, and bioethicists funded through the Clinical Sequencing Exploratory Research (CSER) program are studying the challenges of utilizing genome-sequence data in the routine practice of medicine. In FY 2014, NHGRI will continue to collaborate with the National Cancer Institute (NCI) on The Cancer Genome Atlas (TCGA), a highly successful program that is transforming our knowledge about the genomic changes underlying cancer. In the area of rare diseases, NHGRI recently established three centers to accelerate progress in studying the remaining thousands of rare diseases whose underlying genomic defect is not yet known. Finally, NHGRI is now partnering with the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) to fund research exploring the utility of genome sequencing in the newborn period.

[2] *http://www.genome.gov/sequencingcosts/*

Genomics and Society: Since its inception, NHGRI has funded research to examine the ethical, social, and legal implications (ELSI) of genomic advances and the increasing availability of genomic information. Extramurally funded Centers of Excellence in ELSI Research (CEERs) and work in the institute's intramural research program have placed NHGRI at the forefront of bioethics research and training— indeed, NHGRI remains a leader in bioethics research at NIH.

The exploration of ELSI research questions is an integral component of several NHGRI clinical research initiatives, including the CSER program and the joint NHGRI/NICHD newborn sequencing studies. ELSI researchers are also investigating numerous issues associated with the return of individual research results and incidental findings in genomics research. In FY 2014 NHGRI will continue to fund and conduct research, as well as provide leadership, in this important area.

Genomics and Training: In order to ensure that the rapid pace of genomics research is maintained, it is imperative to train the next generation of researchers with robust expertise in genome sciences. In its Extramural Research Program, NHGRI supports training through a number of programs: institutional training grants, individual fellowships, NHGRI's Diversity Action Plan (DAP), supplements to recruit underrepresented minorities into research careers, and career development awards. In particular, NHGRI's DAP involves training scientists from diverse backgrounds, as well as conducting extensive outreach aimed at underrepresented minorities to inform them about the opportunities in genomics and ELSI research. In its Intramural Research Program, NHGRI also operates a wide range of training programs for post-baccalaureate students, pre- and post-doctoral scientists, physicians, and genetic counselors.

Beyond the Laboratory: DNA sequencing technologies advanced by NHGRI research are also generating public benefit through their application in other areas. For instance, these new technologies are now being used to track infectious outbreaks in hospitals and to monitor the health of ecosystems.

In summary, NHGRI's portfolio of basic and translational research will continue to extend our knowledge about the human genome and how to apply that knowledge to advance human health.

Overall Budget Policy: The FY 2014 President's Budget request for NHGRI is $517.319 million, an increase of $5.061 million or +1.0 percent above the FY 2012 Actual level. Funds are included in R&D contracts to support trans-NIH initiatives, such as the Basic Behavioral and Social Sciences Opportunity Network (OppNet).

Program Descriptions and Accomplishments

Understanding the Structure of Genomes: Understanding the structure of genomes will remain fundamental to NHGRI's research portfolio in FY 2014. The 1000 Genomes project will continue sequencing the genomes of over 2,500 people from 26 populations around the world, providing key information about how the human genome varies between individuals. The 1000 Genomes data are in a publicly accessible resource for the research community. Leveraging this resource allows researchers to maximize the public investment in basic science and 'Big Data'

initiatives, so that tomorrow's breakthroughs can happen more rapidly and at a lower cost. 1000 Genomes data are also being used to develop affordable technologies for individual genome analysis, which will eventually enable physicians to predict a person's risk for various diseases and to choose effective drugs and drug dosages.

The DNA Sequencing Technology Development Program has been one of NHGRI's most successful endeavors to date. Launched in 2004 when the cost of sequencing the ~3 billion bases in an individual's genome cost tens of millions of dollars, the program has been responsible for breathtaking decreases in DNA sequencing costs that have outpaced cost reductions in the computer industry. As a result, the cost of sequencing a human genome has fallen by many orders of magnitude to well below $10,000. By the end of FY 2014, the goal of routine human genome sequencing at a cost of less than $1,000 will almost certainly be achieved. Already, human genome sequencing—once only possible at a handful of large sequencing centers—can be performed at research and clinical laboratories large and small, allowing many NHGRI- and NIH-funded investigators the ability to generate much more data with the same amount of research dollars. In turn, this progress enables studies on the genomic basis of disease as well as the sequencing of patients' genomes on a scale that could not have been contemplated a few years ago. In FY 2014, NHGRI will continue to fund the development of innovative methods for DNA sequencing, with a focus on faster and more accurate genome sequencing for use in clinical care.

Budget Policy: The FY 2014 President's Budget estimate for Understanding the Structure of Genomes is $28.316 million, a decrease of $11.805 million or 29.4 percent less than the FY 2012 Actual level. For several years, NHGRI has been decreasing its investment in this area, as knowledge about the structure of genomes has improved and as the cost of generating data for studying the structure of genomes has dropped (because of improvements in the technologies for sequencing DNA). This shift in priority is consistent with the vision laid out by NHGRI in its 2011 strategic plan for the field of genomics. The activities falling within Understanding the Structure of Genomes will continue NHGRI's signature efforts to decrease the cost of DNA sequencing and to complete the 1000 Genomes Project. In FY 2014, NHGRI will continue its groundbreaking efforts to reduce the cost and improve the quality of DNA sequencing so that this technology, which has increasingly become central to biomedical research, can become a widely disseminated research tool and, beyond that, a clinical tool for healthcare. As the highly successful 1000 Genomes Project publishes its large datasets, further analyses and collection of additional data will enrich the publicly-available resources that inform studies on the Biology of Disease. Additional efforts will improve the reference genome sequences needed for efficiently analyzing thousands of human genome sequences collected in studies to identify variants underlying complex diseases. The Institute also will continue to fund meritorious investigator-initiated applications submitted in response to announcements that encourage new technologies and new approaches to the analysis of genome structure, and the role that genome structure plays in the determination of human disease, disease susceptibility, and environmental sensitivities.

Understanding the Biology of Genomes: The ability to sequence an individual's genome is only part of the puzzle; it is also fundamental to understand how that genome functions. ENCODE is an NHGRI program that has greatly expanded our understanding of the complex molecular choreography required for converting genomic information into living cells and organisms. NHGRI announced a $30 million expansion in cumulative ENCODE funding in

September 2012 that will carry this program beyond FY 2014. Seven production centers will expand the catalog of functional elements in the human and mouse genomes, especially those elements that lie outside of protein-coding regions, thus helping to characterize the most difficult regions to understand both for disease studies and for individual patients. A considerably larger number of human cells and tissues will now be studied by ENCODE. One production center will focus on novel functional roles played by RNA, an area that previously had not been studied in depth by ENCODE. The companion effort to catalog functional elements in the mouse genome will focus on cell types that cannot be readily obtained from humans. Further, NHGRI has established a data coordinating center and a data analysis center, which together will make the ENCODE data more useful to the scientific community; their activities will include the evaluation of data quality, the dissemination of data to the research community, and the analysis of the data to provide new biological insights. To increase the use of ENCODE data, new efforts are being supported to develop novel computational methods to improve data analysis and to make the data more accessible for studying human biology and disease.

Building on ENCODE, NHGRI has advisory approval to start a new effort in FY 2014 called the Genomics of Gene Regulation (GGR) program. Whereas ENCODE is developing a catalog of the genomic elements that play functional roles, GGR will aim to establish some of the 'choreography' that cells employ in using those functional elements in assembling and operating cells and tissues, specifically focusing on elements involved in regulating gene expression.

Budget Policy: The FY 2014 President's Budget estimate for Understanding the Biology of Genomes is $89.442 million, a decrease of $12.539 million or 12.3 percent less than the FY 2012 Actual level. For the past several years, NHGRI's major investment in this strategic area has been the ENCODE (ENCyclopedia Of DNA Elements) Project. ENCODE has been implemented in a phased manner, with transition from the highly successful Phase II to the new Phase III occurring in FY 2012. With the success of ENCODE to date and the ability to generate ENCODE data at lower costs than previously due to technology improvements, NHGRI decided to decrease slightly its activity in this area. This allowed resources to be reallocated towards other strategic research areas for NHGRI and the field of genomics, in particular those aiming to introduce genomics into medical practice. In FY 2014, NHGRI will continue to support the collection and analysis of ENCODE data, including developing new tools to make uses of these data by the research community more efficient and effective. Efforts will expand to integrate ENCODE data with other data types, and to understand how changes in functional elements in human genomes result in changes to biology that cause disease. Also in FY 2014, support for the CEGS program will continue to stimulate highly innovative research approaches that will substantially advance genomic methods to the study of a biological problem, and to foster the wider application of comprehensive, high-throughput genomics methods to the study of human biology and disease. The Institute also will continue to fund meritorious investigator-initiated applications submitted in response to announcements that encourage new technologies and new approaches to the analysis of genome biology.

Program Portrait: Elucidating How Genes are Regulated

FY 2013 Level: $43.1 million
FY 2014 Level: $46.1 million
Change: +$3.0 million

The decade of genomics research since the completion of the Human Genome Project has revealed much about the complexity of genome biology, yet our knowledge about how genes are controlled remains incomplete. All cells are built from the same set of genomic instructions, but are as specialized and different as muscle cells, neurons, and blood cells because of the differential regulation of how genes are regulated.

ENCODE is an ambitious NHGRI research program that is cataloging the functional regions of the human genome that regulate where and when individual genes or groups of genes are turned on or off. In September 2012, ENCODE published a landmark series of 30 papers in the journals *Nature*, *Genome Research*, and *Genome Biology*, reporting the results of >1600 different experiments. The magnitude and complexity of the data required creation of a novel way of accessing the findings, available at www.nature.com/encode.

In FY 2014, ENCODE will significantly expand the numbers of functional DNA elements studied, as well as scaling up the analysis of RNA-binding proteins and RNA elements. This resource of basic science is already being used by researchers across the biomedical research enterprise to power tomorrow's breakthroughs, and ENCODE data have been used by other scientists for important discoveries relevant to the study of Alzheimer's disease, diabetes, cancer, and cardiovascular disease.

Just as differential gene regulation results in the many and varied cells and tissues that make up a human, subtle variation between the genomes of different individuals (less than 0.5 percent) is responsible for making each of us a unique person. The 1000 Genomes project is an international research consortium led by NHGRI, the UK's Wellcome Trust, and BGI-Shenzhen of China. The project is building the most detailed map of human genetic variation from genome sequence data generated from >2,600 individuals from 26 different populations across the world. 1000 Genomes data are publicly available to researchers, and has already been successfully used to inform studies ranging from evolutionary biology to disease-focused research.

By 2014, the sets of data from both ENCODE and 1000 Genomes will be substantively expanded, providing key data resources for linking basic research results to studies exploring the biology of disease.

Using Genomics to Understand the Biology of Disease: An ultimate goal of the Human Genome Project was to establish how an individual's genetic code influences their health, and to apply that knowledge to optimize their health and prevent disease. As our understanding of the structure and biological function of the human genome grows, NHGRI's research portfolio is expanding to develop approaches for using genomics to better understand the biology of disease. In this manner, NHGRI's basic research will be translated to studying human disease and then, in turn, to improving health and healthcare.

For instance, cancer is a genomic disease, as it is intricately linked to major alterations in an individual's genome. The Cancer Genome Atlas (TCGA), a collaboration between NHGRI and NCI, aims to apply genome-analysis technologies for cataloging the genomics alterations that occur in 25 different tumor types by 2014. In September 2012, TCGA researchers published landmark findings about the major genomic alterations in lung squamous cell carcinoma, the

most common form of lung cancer. Importantly, these findings included the identification of a number of promising therapeutic targets that may lead to targeted clinical trials for patients with specific genomic alterations. Also in September 2012, a separate group of TCGA researchers published research that has revealed new insights into the four primary subtypes of breast cancer. In this study, they discovered marked genomic similarities between a type of breast cancer ('basal-like' or 'triple negative') and a common form of ovarian cancer. Computational analyses show that basal-like breast cancer and serous ovarian cancer might both be susceptible to drugs under development that inhibit blood vessel growth, thereby cutting off the blood supply to (and thus starving) the tumor, as well as to certain existing chemotherapeutic agents such as cisplatin. In FY 2014, TCGA will expand its efforts to the analysis of 25 different tumor types.

NHGRI's Intramural Research Program is also pursuing research to advance knowledge about the genomic contributors to disease. In the case of common diseases, the ClinSeq project will be examining clinical strategies for widespread use of genome sequencing in a clinical setting, initially focusing on cardiovascular disease. At the other end of the spectrum, rare diseases are the focus of the Undiagnosed Diseases Program (UDP), which draws on the resources and clinical expertise at the NIH Clinical Center to investigate medical mysteries, ideally arriving at diagnoses and possible treatment options for patients whose conditions have confounded medical experts, advancing our understanding about rare and common diseases in the process.

Budget Policy: The FY 2014 President's Budget estimate for Using Genomics to Understand the Biology of Disease is $158.935 million, an increase of $10.76 million or 7.3 percent more than the FY 2012 Actual level. NHGRI will continue to maintain and update the GWAS Catalog and to support whole-exome and whole-genome sequencing for the discovery of disease-related genes and other functional genomic regions. The Institute will continue to fund meritorious investigator-initiated applications that will increase the ability of genomics to enhance understanding of disease etiology and pathogenesis.

Program Portrait: Discovering Disease Genes

FY 2012 Level: $88.5 million
FY 2014 Level: $88.6 million
Change: +$0.1million

Determining the genomic basis for human disease was a major impetus behind the Human Genome Project, and continues to be a central focus of NHGRI research. Current research programs in this area are discovering the causative genes across the spectrum of human disease, from rare and monogenic disorders to common complex diseases. The Undiagnosed Diseases Program (UDP) is focused on diseases at the rarest end of this spectrum. The highly successful and heavily subscribed UDP is a trans-NIH initiative, conceived and administered by NHGRI and conducted at the NIH Clinical Center. UDP harnesses the expertise of a diverse range of medical specialties to provide answers to patients with mysterious conditions that have long eluded diagnosis, advancing our knowledge about rare and common diseases in the process. In response to an overwhelming demand, UDP will be expanded in FY 2014 through the NIH Common Fund to eventually create a network of medical research centers across the nation involved in the program.

For approximately half of the more than 6,000 rare inherited (Mendelian) diseases caused by a single mutated gene, the genetic culprit is not known. An estimated 25 million Americans suffer from a Mendelian disease, ranging from well-known conditions such as cystic fibrosis to those that may affect only a few families. In FY 2014, the NHGRI Mendelian Disorders Genome Centers Program, with support from the National Heart, Lung, and Blood Institute (NHLBI), will be funding three groups to systematically find the genetic underpinnings of these illnesses. The Centers will collaborate with a worldwide network of rare disease experts to sequence the genomes of thousands of patients and their family members to identify the responsible genomic variants causing the underlying rare disease.

At the opposite end of the spectrum are complex diseases that are among the leading causes of morbidity and mortality in the country, yet have complex genomic etiologies. The Cancer Genome Atlas (TCGA), a joint program between NHGRI and NCI, has been applying genome sequencing to gain new insights into cancer biology. In September 2012, separate groups of TCGA researchers published findings about the number and variety of genomic alterations in the most common form of lung cancer and the four primary subtypes of breast cancer. Importantly, these findings included the identification of some promising therapeutic targets.

Using Genomics to Advance Medical Science: Information from an individual patient's genome sequence will increasingly be used by clinicians to diagnose disease and guide therapeutic decision-making. With our understanding about the underlying genomic basis for disease growing and the cost of DNA sequencing decreasing, we are already seeing early advances in medical science. However, the adoption of genomic approaches in medical practice will require that genomic information be provided to clinicians in way that are easy to understand and use. Importantly, research is needed to understand how best to execute this information transfer.

Important new activities in this area include NHGRI's Clinical Sequencing Exploratory Research (CSER) program, which in FY 2014 will fund multidisciplinary teams at six centers to establish the analysis and interpretation tools, standard procedures, and institutional practices needed to integrate genome-sequence information into the clinical workflow. Integral to the specific projects in this program are studies examining the significant bioethical issues relevant to: acquiring large amounts of genome-sequence data from patients as part of their medical care; deciding what genomic findings to return to patients; and deciding when and how to communicate such findings to patients and their families. These groups are studying the use of

genome sequencing in multiple areas (including cancer and cardiovascular disease), examining issues for pediatric as well as adult patients, and investigating the delivery of these advanced approaches to underserved minority populations.

Budget Policy: The FY 2014 President's Budget estimate for Using Genomics to Advance Medical Science is $33.784 million, an increase of $4.75 million or 16.4 percent more than the FY 2012 Actual level. Large-scale genome sequencing is increasingly being applied to the clinical diagnosis and potential treatment of diseases in programs such as the Undiagnosed Diseases Program and the Electronic Medical Records and Genomes Pharmacogenomics Program (eMERGE-PGx). Many of the new opportunities will be pursued in collaboration with other NIH Institutes/Centers. The Institute will continue to fund meritorious investigator-initiated applications that will improve the understanding and application of genomic function in risk assessment, diagnosis, and treatment of human disease.

Using Genomics to Improve the Effectiveness of Healthcare: Building a robust research portfolio in this area requires a broad foundation of research accomplishments within the four areas listed above, and it will be many years before a significant proportion of genomics research is focused on this. Nonetheless, to ensure readiness for this responsibility, NHGRI is beginning to fund preliminary research in this area. The Electronic MEdical Records and GEnomics (eMERGE) Network currently consists of a nine-member consortium of research centers and healthcare providers, and is investigating the utility and practical challenges of integrating patients' genomic information with their electronic medical records, with a focus on genomic information relevant to patients' responses to medications. The combined genomic and phenotypic (observable traits, characteristics, and symptoms) information collected in the electronic medical records enables novel approaches to clinical research and patients' ongoing clinical care. In FY 2014, the eMERGE Network will also explore the complex ethical, legal, and social issues involved with the use of electronic medical records for genomics research and the return of genomic information to patients, as well as developing best practices for the sharing of genomic data.

Also in FY 2014, NHGRI will fund between three and five collaborative Genomic Medicine Demonstration Projects in collaboration with NCI to develop methods for, and evaluate the feasibility of, incorporating an individual patient's genomic findings into his or her clinical care. This program aims to: define barriers to implementing genomic medicine in general, and consider how they relate to diverse clinical settings and populations; develop and disseminate solutions to these barriers, as well as the processes needed for genomic medicine implementation; assess outcomes of genomic medicine implementation projects; and identify outcomes most important to ensuring rapid and sustained adoption of genomic medicine as a medical discipline.

Budget Policy: The FY 2014 President's Budget estimate for Using Genomics to Improve the Effectiveness of Healthcare is $13.164 million, an increase of $3.561 million or 37.0 percent more than the FY 2012 Actual level. NHGRI will continue in FY 2014 to support this area of research in the Clinically Relevant Variants Resource to assess evidence for clinical relevance of genomic variation and the Genomic Medicine Demonstration Projects to test new approaches for implementing genomic medicine to improve healthcare. The Institute also will continue to fund

meritorious investigator-initiated applications, and to collaborate with other NIH Institutes/Centers in studying genomic applications to healthcare.

Program Portrait: Operationalizing Genomic Medicine

FY 2013 Level: $25.2 million
FY 2014 Level: $33.8 million
Change: +$8.6 million

As NHGRI's investment in basic genomics research expands our knowledgebase about the structure of the genome, its biological function, and its role in human disease, researchers are increasingly able to translate that knowledge for medical applications. Genomic medicine is an emerging medical discipline that involves using genomic information about an individual as part of their clinical care for diagnostic and therapeutic decision-making. The incorporation of genomic medicine as a routine component of clinical care requires that the effectiveness of using genomic information to improve health outcomes be demonstrated. In FY 2014, NHGRI's Extramural Research Program will support research and NHGRI's Intramural Research Program will conduct clinical studies to generate such evidence.

For example, the Clinically Relevant Variants Resource program aims to develop a consensus approach for collecting, abstracting, and evaluating the published research regarding the clinical relevance of genomic variants associated with clinically important traits. The synthesis of these data and their supporting evidence into a user-friendly electronic resource will stimulate further research, and serve as the substrate for development of practice guidelines by professional and clinical organizations.

The Genomic Sequencing and Newborn Screening Disorders Program, funded in conjunction with the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), aims to explore specific scientific challenges and opportunities related to the use of emerging genome-sequencing technologies in the context of newborn screening. In FY 2014, this program will fund multidisciplinary research studies to collect comprehensive genomic sequence datasets from newborns, and investigate how genome sequencing might be applied to newborn screening to gain new insights into newborn health.

Bioinformatics and Computational Biology: A consequence of the rapid reduction in the cost of DNA sequencing is that the computational analysis of the generated data—rather than the actual generation of that sequence data—has become the major bottleneck in genomics research. Recognizing this, NHGRI funds bioinformatics and computational biology research projects to improve how scientists manage and analyze the large volumes of data generated by genome sequencing, and to develop methods to visualize the data in ways that enable non-specialists to interpret the data. As genomic information is increasingly incorporated into clinical practice, this will be crucial, as the healthcare providers who will be using these data will most often not be genomics experts themselves. In FY 2014, NHGRI will develop programs that aim to computationally integrate the large datasets characteristic of genomics research (including those produced by 1000 Genomes, ENCODE, the NIH Common Fund Epigenomics project, and others), thereby adding value to each and enabling their broad use by the community of biomedical researchers.

Budget Policy: The FY 2014 President's Budget estimate for Bioinformatics and Computational Biology is $110.012 million, an increase of $1.479 million or 1.4 percent more than the FY 2012 Actual level. Activity in Bioinformatics and Computational Genomics research will increase with efforts to manage the increasing amount and complexity of genomic data. This will be

accomplished through support of databases that collect and efficiently present, to basic and clinical research scientists, datasets that grow rapidly in size and complexity. Considerable support will be provided to developing new algorithms for analyzing and integrating genomic data, and making those software tools more widely accessible. Efforts to increase the efficiency of data storage and distribution will continue, to match the growing size of genomic datasets produced as studies expand on the genomic contributions to disease. The Institute also will continue to fund meritorious investigator-initiated applications submitted in response to announcements that encourage new technologies and new approaches to the rapidly emerging issue of public access to large genomic datasets.

Education and Training: An appropriately trained workforce and public will be essential for the beneficial realization of genomic advances. Scientists will need to be trained in bioinformatics and computational analyses as well as biological sciences. Healthcare professionals will need to understand the connections between genomic data and its medical applications. The public will need to understand the basics of genomics and the link between their own genome and their health. To that end, FY 2014 will bring efforts by NHGRI to foster and support many education and training activities aimed at various core audiences: the next generation of genomics and genomic medicine researchers; healthcare providers; and the general public (through the incorporation of genomics into primary and secondary education, as well as lifelong learning outreach).

To stimulate the development of programs that meet these needs and in response to high-priority areas identified by a working group of the National Advisory Council for Human Genome Research, NHGRI will support training programs in the following areas in FY 2014: statistics; bioinformatics; translation of basic genomics into clinical practice; and development and exploration of new genomic technologies for the early detection of disease. These areas of expertise, which are necessary to take full advantage of the very large datasets generated by both basic and clinical genomics studies, were identified as lacking in the workforce.

Budget Policy: The FY 2014 President's Budget estimate for Education and Training is $28.474 million, an increase of $7.036 million or 32.8 percent more than the FY 2012 Actual level. In FY 2014, NHGRI will continue its support for training the next generation of genomics researchers, as well as programs aimed at bringing genomics to healthcare professionals and the general public. NHGRI also plans to increase its support for training in the following areas: bioinformatics, data science, and genomic medicine.

Genomics and Society: Since its inception, NHGRI has dedicated five percent of its research funding to examine the ethical, legal, and social implications (ELSI) of genomic advances and the increasing availability of genomic information in society. This research area continues to be a vital component of the Institute's strategic vision. In FY 2014, the program will continue to explore issues that arise in the design and conduct of genomics research, particularly those related to the clinical applications of genomics. Questions of particular interest include those related to informed consent for genomics research; privacy issues arising from the use of large-scale research databases; when and how to return individual genomic results to research participants; and whether and how to provide information about unanticipated health-related genomic findings to participants.

In addition to multiple standing funding announcements to stimulate ELSI research, the NHGRI-funded Return of Results Consortium, a group of investigators conducting normative and empirical research on issues relating to the return of research results and incidental findings in the context of genomics research and clinical care, will begin in FY 2014 to generate results that should inform future genomic medicine programs. In addition, other clinical and laboratory projects (such as the CSER Consortium, the eMERGE Network, and the newborn screening initiative) will include elements that address ELSI questions.

Within the Institute's Intramural Research Program, the Social and Behavioral Research Branch will continue in FY 2014 to conduct leading-edge research testing the effectiveness of strategies for communicating information about genetic risks; develop and evaluate behavioral interventions relevant to genomics; analyze how to use genomic discoveries in clinical practice; and explore the social, ethical, and policy implications of genomics research.

Budget Policy: The FY 2014 President's Budget estimate for Genomics and Society is $29.070 million, an increase of $0.11 million or 0.4 percent more than the FY 2012 Actual level. This amount represents more than the 5.0 percent of the total NHGRI budget that NHGRI is legislatively mandated to spend in this area of research. In FY 2014, NHGRI will continue to support the ELSI research program and the Intramural Research Program's Social and Behavioral Research Branch in their efforts to anticipate and address the social, legal, and ethical issues that will arise from new information about the human genome and the genetic contributions to human disease, in addition to the development of new approaches for applying that information to the improvement of human health.

Research Management and Support: NHGRI's Division of Policy, Communications, and Education uses Research Management and Support funds to provide key leadership for a number of ongoing initiatives, including National DNA Day and other educational outreach activities, as well as community-focused genomics programs. NHGRI also continues to provide leadership in the area of healthcare professional education, developing web-based resources such as the Genetics/Genomics Competency Center (G2C2) (g-2-c-2.org; a central repository for health professional education resources) and the Global Genetics and Genomics Community (G3C) (g-3-c.com; a bilingual collection of virtual clinical case studies that provides clinical trainees with a self-guided learning experience).

Budget Policy: The FY 2014 President's Budget estimate for the Research Management and Support program is $26.122 million, an increase of $1.709 million or 7.0 percent more than the FY 2012 Actual level. In FY 2014, NHGRI will continue to improve efficiencies in travel and conferences in an effort to reduce costs. NHGRI also plans to continue addressing the challenges and opportunities that exist in strategically managing a research portfolio that addresses areas of critical research.

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

Budget Authority by Object Class
(Dollars in Thousands)

	FY 2012 Actual	FY 2014 PB	Increase or Decrease
Total compensable workyears:			
Full-time employment	338	346	8
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary (in whole dollars)	$173,632	$174,327	$695
Average GM/GS grade	12.3	12.3	0.0
Average GM/GS salary (in whole dollars)	$100,067	$100,503	$436
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207) (in whole dollars)	$103,992	$105,760	$1,768
Average salary of ungraded positions (in whole dollars)	$134,869	$135,409	$540

	OBJECT CLASSES	FY 2012 Actual	FY 2014 PB	Increase or Decrease
	Personnel Compensation:			
11.1	Full-time permanent	$15,742	$16,751	$1,009
11.3	Other than full-time permanent	16,097	16,486	389
11.5	Other personnel compensation	516	553	37
11.7	Military personnel	707	731	24
11.8	Special personnel services payments	3,961	4,035	74
	Total, Personnel Compensation	**$37,023**	**$38,556**	**$1,533**
12.0	Personnel benefits	$9,757	$10,156	$399
12.2	Military personnel benefits	498	508	10
13.0	Benefits for former personnel	0	0	0
	Subtotal, Pay Costs	**$47,278**	**$49,220**	**$1,942**
21.0	Travel and transportation of persons	$1,881	$1,881	$0
22.0	Transportation of things	126	126	0
23.1	Rental payments to GSA	0	0	0
23.2	Rental payments to others	4	4	0
23.3	Communications, utilities and miscellaneous charges	419	419	0
24.0	Printing and reproduction	23	23	0
25.1	Consulting services	759	825	66
25.2	Other services	20,519	17,701	(2,818)
25.3	Purchase of goods and services from government accounts	59,668	62,607	2,939
25.4	Operation and maintenance of facilities	328	328	0
25.5	Research and development contracts	1,899	2,407	508
25.6	Medical care	561	561	0
25.7	Operation and maintenance of equipment	2,173	2,173	0
25.8	Subsistence and support of persons	0	0	0
25.0	**Subtotal, Other Contractual Services**	**$85,907**	**$86,602**	**$695**
26.0	Supplies and materials	$7,992	$7,992	$0
31.0	Equipment	3,835	3,835	0
32.0	Land and structures	9	9	0
33.0	Investments and loans	0	0	0
41.0	Grants, subsidies and contributions	364,783	367,207	2,424
42.0	Insurance claims and indemnities	0	0	0
43.0	Interest and dividends	1	1	0
44.0	Refunds	0	0	0
	Subtotal, Non-Pay Costs	**$464,980**	**$468,099**	**$3,119**
	Total Budget Authority by Object Class	**$512,258**	**$517,319**	**$5,061**

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)	$15,742	$16,751	$1,009
Other than full-time permanent (11.3)	16,097	16,486	389
Other personnel compensation (11.5)	516	553	37
Military personnel (11.7)	707	731	24
Special personnel services payments (11.8)	3,961	4,035	74
Total Personnel Compensation (11.9)	**$37,023**	**$38,556**	**$1,533**
Civilian personnel benefits (12.1)	$9,757	$10,156	$399
Military personnel benefits (12.2)	498	508	10
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	**$47,278**	**$49,220**	**$1,942**
Travel (21.0)	$1,881	$1,881	$0
Transportation of things (22.0)	126	126	0
Rental payments to others (23.2)	4	4	0
Communications, utilities and miscellaneous charges (23.3)	419	419	0
Printing and reproduction (24.0)	23	23	0
Other Contractual Services:			
Advisory and assistance services (25.1)	759	825	66
Other services (25.2)	20,519	17,701	(2,818)
Purchases from government accounts (25.3)	47,069	47,488	419
Operation and maintenance of facilities (25.4)	328	328	0
Operation and maintenance of equipment (25.7)	2,173	2,173	0
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$70,848**	**$68,515**	**($2,333)**
Supplies and materials (26.0)	$7,988	$7,988	$0
Subtotal, Non-Pay Costs	$81,289	$78,956	($2,333)
Total, Administrative Costs	**$128,567**	**$128,176**	**($391)**

NATIONAL INSTITUTES OF HEALTH
National Human Genome Research Institute

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:	6	-	6	6	-	6	6	-	6
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	6	-	6	6	-	6	6	-	6
Division of Management									
Direct:	26	-	26	26	-	26	26	-	26
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	26	-	26	26	-	26	26	-	26
Division of Policy, Communications and Education									
Direct:	11	-	11	11	-	11	11	-	11
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	11	-	11	11	-	11	11	-	11
Division of Intramural Research									
Direct:	218	8	226	218	8	226	218	8	226
Reimbursable:	24	-	24	24	-	24	24	-	24
Total:	242	8	250	242	8	250	242	8	250
Division of Genome Sciences									
Direct:	9	-	9	12	-	12	12	-	12
Reimbursable:	4	-	4	4	-	4	4	-	4
Total:	13	-	13	16	-	16	16	-	16
Division of Genomic Medicine									
Direct:	11	-	11	11	-	11	11	-	11
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	13	-	13	13	-	13	13	-	13
Division of Genomics and Society									
Direct:	4	-	4	6	-	6	6	-	6
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	4	-	4	6	-	6	6	-	6
Division of Extramural Operations									
Direct:	13	-	13	16	-	16	16	-	16
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	15	-	15	18	-	18	18	-	18
Total	330	8	338	338	8	346	338	8	346
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	12.1
2011	12.1
2012	12.3
2013	12.3
2014	12.3

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National Human Genome Research Institute

Detail of Positions

GRADE	FY 2012 Actual	FY 2013 CR	FY 2014 PB
Total, ES Positions	2	2	2
Total, ES Salary	$ 347,265	$ 347,265	$ 347,265
GM/GS-15	30	30	30
GM/GS-14	23	28	28
GM/GS-13	51	51	51
GS-12	49	50	50
GS-11	17	17	17
GS-10	3	3	3
GS-9	6	6	6
GS-8	17	17	17
GS-7	1	2	2
GS-6	0	1	1
GS-5	0	0	0
GS-4	0	0	0
GS-3	1	1	1
GS-2	0	0	0
GS-1	0	0	0
Subtotal	198	206	206
Grades established by Act of July 1, 1944 (42 U.S.C. 207):			
Assistant Surgeon General	0	0	0
Director Grade	5	5	5
Senior Grade	2	2	2
Full Grade	1	1	1
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	8	8	8
Ungraded	147	147	147
Total permanent positions	208	213	213
Total positions, end of year	355	363	363
Total full-time equiv (FTE) at YE	338	346	346
Average ES salary	$ 173,632	$ 173,632	$ 174,327
Average GM/GS grade	12.3	12.3	12.3
Average GM/GS salary	$ 100,067	$ 100,102	$ 100,503

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