

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

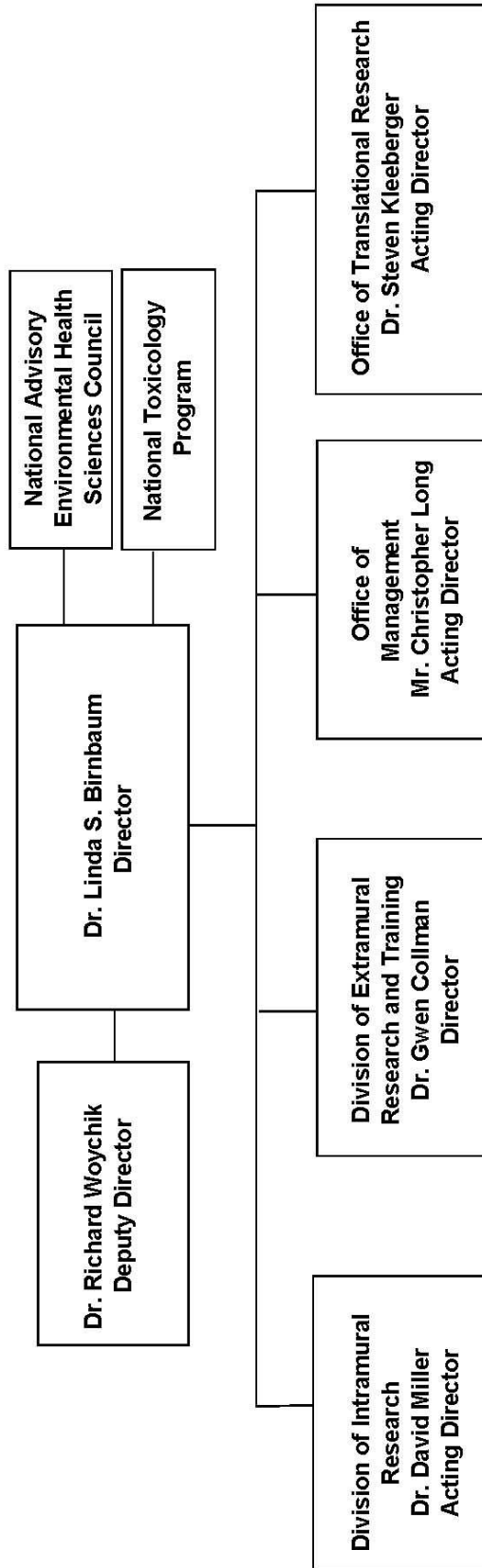
National Institute of Environmental Health Sciences (NIEHS)

FY 2012 Budget.....	Page No.
Organization Chart.....	2
Appropriation Language.....	3
Amounts Available for Obligation.....	4
Budget Mechanism Table.....	5
Major Changes in Budget Request.....	6
Summary of Changes.....	7
Budget Graphs.....	9
Budget Authority by Activity.....	10
Authorizing Legislation.....	11
Appropriations History.....	12
Justification of Budget Request.....	13
Budget Authority by Object Class.....	22
Salaries and Expenses.....	23
Detail of Full-Time Equivalent Employment (FTE).....	24
Detail of Positions.....	25
New Positions Requested.....	26

NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences

Organization Structure



NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences

For carrying out section 301 and title IV of the Public Health Services Act with respect to environmental health sciences \$700,537,000.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Amounts Available for Obligation ¹
(Dollars in Thousands)

Source of Funding	FY 2010 Actual	FY 2011 CR	FY 2012 PB
Appropriation	689,781	689,781	700,537
Rescission	0	0	0
Supplemental	0	0	0
Subtotal, adjusted appropriation	689,781	689,781	700,537
Real transfer under Director's one-percent transfer authority (GEL)	5,302	0	0
Real transfer under Secretary's one-percent transfer authority	(103)	0	0
Comparative Transfers to NLM for NCBI and Public Access	(232)	(587)	0
Comparative transfer under Director's one-percent transfer authority (GEL)	(5,302)	0	0
Comparative transfer under Secretary's one-percent transfer authority	0	0	0
Subtotal, adjusted budget authority	689,446	689,194	700,537
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	689,446	689,194	700,537
Unobligated balance lapsing	(173)	0	0
Total obligations	689,273	689,194	700,537

¹ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2010 - \$2,637 FY 2011 - \$2,637 FY 2012 - \$2,637
Excludes \$199,607 in FY2010 and \$279,066 in FY2011 for royalties.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences
Budget Mechanism - Total ^{1/}
(Dollars in Thousands)

MECHANISM	FY 2010 Actual		FY 2011 CR		FY 2012 PB		Change vs. FY 2010	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Grants								
<u>Research Projects</u>								
Noncompeting	438	\$190,133	463	\$193,372	447	\$187,779	9	(\$2,354)
Administrative Supplements	30	2,372	30	2,372	20	1,500	(10)	(872)
Competing:								
Renewal	31	12,904	25	10,395	29	11,980	(2)	(924)
New	147	49,279	127	43,390	147	50,008	0	729
Supplements	7	1,762	5	1,419	6	1,636	(1)	(126)
Subtotal, Competing	185	\$63,945	157	\$55,204	182	\$63,624	(3)	(\$321)
Subtotal, RPGs	623	\$256,450	620	\$250,948	629	\$252,903	6	(\$3,547)
SBIR/STTR	40	\$12,764	37	\$11,931	40	\$12,943	0	\$179
Research Project Grants	663	\$269,214	657	\$262,879	669	\$265,846	6	(\$3,368)
<u>Research Centers</u>								
Specialized/Comprehensive	29	\$37,477	29	\$37,477	29	\$37,852	0	\$375
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
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	29	\$37,477	29	\$37,477	29	\$37,852	0	\$375
<u>Other Research</u>								
Research Careers	41	\$5,610	48	\$6,610	49	\$6,676	8	\$1,066
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	2	1,418	0	0	0	0	(2)	(1,418)
Other	33	2,785	39	3,260	39	3,292	6	507
Other Research	76	\$9,813	87	\$9,870	88	\$9,968	12	\$155
Total Research Grants	768	\$316,504	773	\$310,226	786	\$313,666	18	(\$2,838)
<u>Research Training</u>								
Individual Awards	<u>FTEs</u> 55	\$2,112	<u>FTEs</u> 55	\$2,141	<u>FTEs</u> 55	\$2,200	0	\$88
Institutional Awards	426	16,878	426	17,124	426	17,620	0	742
Total Research Training	481	\$18,990	481	\$19,265	481	\$19,820	0	\$830
Research & Development Contracts (<i>SBIR/STTR</i>)	119	\$149,285	119	\$148,545	119	\$153,717	0	\$4,432
	8	\$937	8	\$937	0	\$167	(8)	(\$770)
Intramural Research	<u>FTEs</u> 550	\$182,014	<u>FTEs</u> 550	\$187,385	<u>FTEs</u> 550	\$189,335	<u>FTEs</u> 0	\$7,321
Research Management and Support	116	22,653	117	23,773	117	23,999	1	1,346
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIEHS	666	\$689,446	667	\$689,194	667	\$700,537	1	\$11,091

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

Major Changes in the Fiscal Year 2012 Budget Request

Major changes by budget mechanism and/or budget program 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 2012 budget request for NIEHS, which is \$11.091 million more than the FY 2010 level, for a total of \$700.537 million.

Research Project Grants (RPGs) (-\$3.368 million; total \$265.846 million): NIEHS expects to support a total of 669 RPG awards in FY 2012. Noncompeting RPGs will increase by 9 awards and decrease by \$2.354 million from the FY 2010 level. Competing RPGs will decrease by 3 awards and \$321 thousand. The NIH Budget policy for RPGs in FY 2012 is to provide an inflationary increase of 1% for noncompeting awards and allow a 1% increase in the average cost of competing RPGs. NIEHS will continue to support new investigators in FY 2012.

Clinical and Translational Research: Bench to Bedside to Public Health (+\$22.380 million; total \$201.787 million): Additional funding in this program will be used to support a number of initiatives. A new research effort is getting underway to find biological markers of mitochondrial dysfunction, which is associated with numerous chronic diseases including Type II diabetes, metabolic syndrome, neurodegenerative diseases, blindness, cardiovascular disease, and cancer. Funds in the Clinical and Translational Research program are also supporting the development of a new translational research program called “ViCTER”: Virtual Consortium for Translational/Transdisciplinary Environmental Research.” A third initiative is intended to support efforts to examine the differential risk factors of populations that reflect increased vulnerability to exposures, diseases, and other adverse health outcomes that are linked to, or likely to result from, climate change.

Toxicity Testing and Evaluation (+\$3.132 million; total \$85.359 million): The additional funds will be used to support cooperative agreements to assist in the creation of refined toxicology methods to evaluate long-term outcomes from exposures during development.

Basic Mechanisms in Human Biology (-\$23.593 million; total \$121.692 million): The decrease in the resources provided to the Basic Mechanisms in Human Biology program reflects the completion of a number of initiatives undertaken over the past five years. These include earlier work on comparative biology approaches for studying environmental susceptibility; environmental influences on epigenetic regulation; and gene/environment interactions in neurodegeneration. For some of this work, this change in funding represents a maturation of the field towards research with human tissues and subjects, which is reflected in the proposed increase in the Clinical and Translational Research program.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences
Summary of Changes
(Dollars in Thousands)

FY 2010 Actual				\$689,446
FY 2012 Estimate				700,537
Net change				\$11,091
CHANGES	2012 Estimate		Change from FY 2010	
	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2010 pay increase		\$77,854		\$471
b. January FY 2012 pay increase		77,854		0
c. One less day of pay (n/a for 2011)		77,854		(302)
d. Payment for centrally furnished services		23,878		236
e. Increased cost of laboratory supplies, materials, and other expenses		87,603		851
Subtotal				\$1,256
2. Research Management and Support:				
a. Annualization of January 2010 pay increase		\$14,368		\$81
b. January FY 2012 pay increase		14,368		0
c. One less day of pay (n/a for 2011)		14,368		(55)
d. Payment for centrally furnished services		2,506		25
e. Increased cost of laboratory supplies, materials, and other expenses		7,125		69
Subtotal				\$120
Subtotal, Built-in				\$1,376

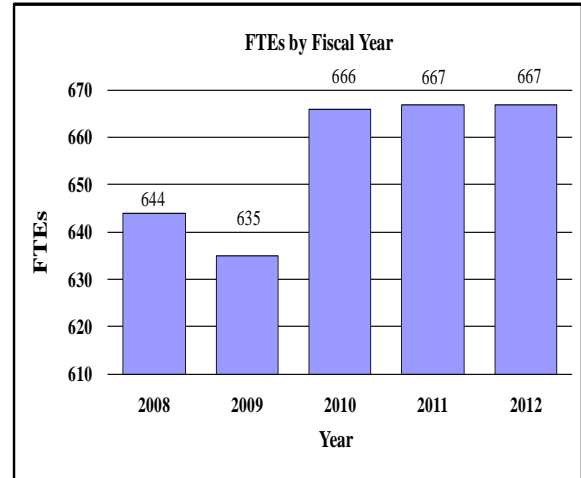
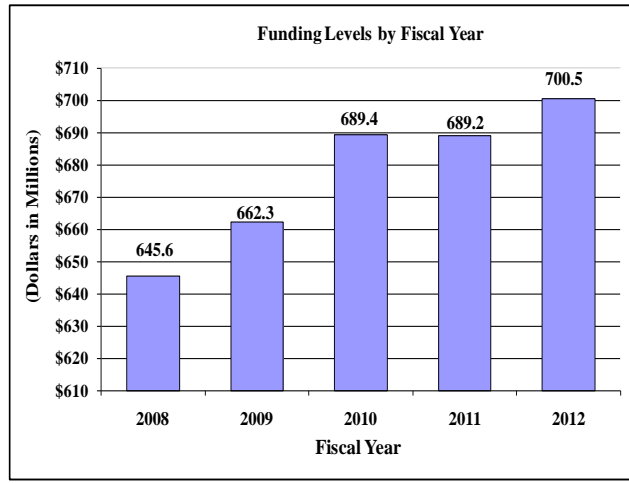
NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Summary of Changes--continued

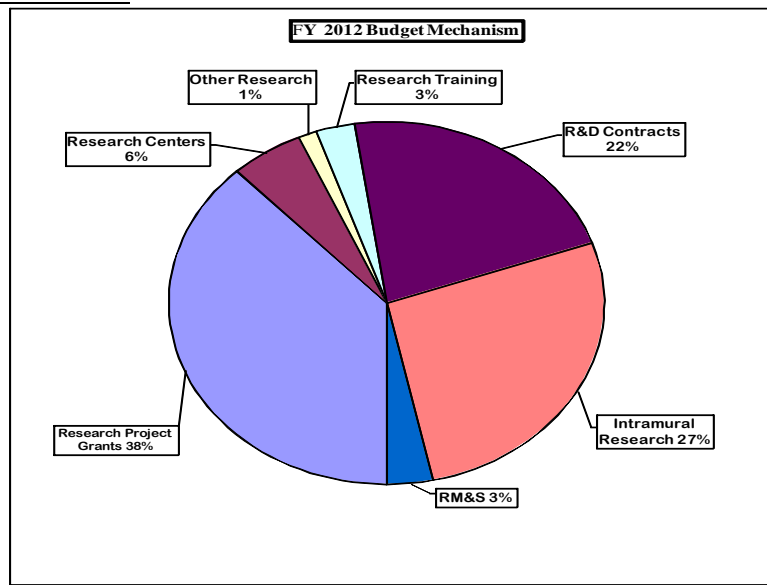
CHANGES	2012 Estimate		Change from FY 2010	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	447	\$189,279	9	(\$3,226)
b. Competing	182	63,624	(3)	(321)
c. SBIR/STTR	40	12,943	0	179
Total	669	\$265,846	6	(\$3,368)
2. Research Centers	29	\$37,852	0	\$375
3. Other Research	88	9,968	12	155
4. Research Training	481	19,820	0	830
5. Research and development contracts	119	153,717	0	4,432
Subtotal, Extramural		\$487,203		\$2,424
6. Intramural Research	<u>FTEs</u> 550	\$189,335	<u>FTEs</u> 0	\$6,065
7. Research Management and Support	117	23,999	1	1,226
Subtotal, program	667	\$700,537	1	\$9,715
Total changes		\$700,537		\$11,091

FY2012 Budget Graphs

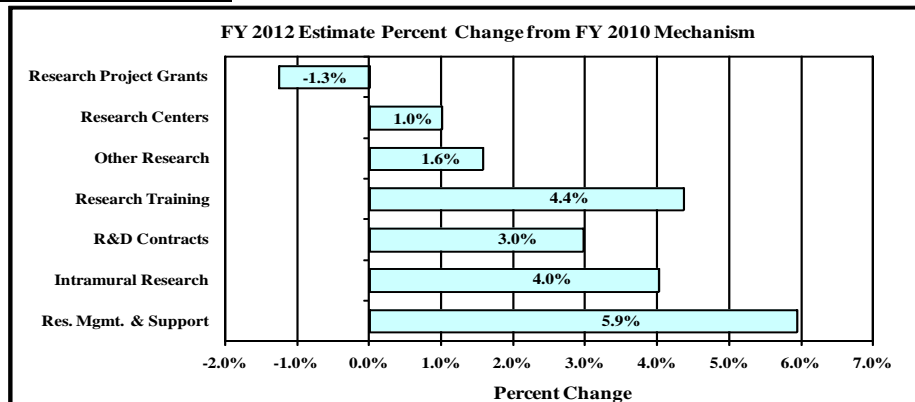
History of Budget Authority and FTEs:



Distribution by Mechanism:



Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences
Budget Authority by Activity
(Dollars in thousands)

	FY 2010 Actual		FY 2011 CR		FY 2012 PB		Change vs. FY 2010	
	FTEs	Amount	FTEs	Amount	FTEs	Amount	FTEs	Amount
Extramural Research								
<u>Detail:</u>								
Clinical and Translational Research:								
Bench to Bedside to Public Health		\$179,406		\$192,507		\$201,787		\$22,381
Toxicity Testing and Evaluation		82,227		85,359		85,359		3,132
Basic Mechanisms in Human Biology		145,285		127,841		121,692		-23,593
Exposure Biology/Exposure Measurement		26,178		20,698		26,680		502
Pathways for Future Environmental Health Scientists		51,683		51,631		51,685		2
Subtotal, Extramural		\$484,779		\$478,036		\$487,203		\$2,424
Intramural Research	550	\$182,014	550	\$187,385	550	\$189,335	0	\$7,321
Research Management & Support	116	\$22,653	117	\$23,773	117	\$23,999	1	\$1,346
TOTAL	666	\$689,446	667	\$689,194	667	\$700,537	1	\$11,091

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

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

**NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences**

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2011 Amount Authorized	FY 2010 Estimate	2012 Amount Authorized	FY 2012 PB
Research and Investigation	Section 301	42§241	Indefinite		Indefinite	
National Institute of Environmental Health Sciences	Section 401(a)	42§281	Indefinite	\$689,446,000	Indefinite	\$700,537,000
Total, Budget Authority						\$700,537,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2003	\$609,705,000	\$609,705,000	\$617,258,000	\$618,258,000
Rescission				(\$4,019,000)
2004	\$630,774,000	\$630,774,000	\$637,074,000	\$636,974,000
Rescission				(\$4,582,000)
2005	\$650,027,000	\$650,027,000	\$655,100,000	\$650,027,000
Rescission				(\$5,522,000)
2006	\$647,608,000	\$647,608,000	\$667,372,000	\$647,608,000
Rescission				(\$6,476,000)
2007	\$637,323,000	\$637,323,000	\$641,292,000	\$642,002,000
2008	\$637,406,000	\$652,303,000	\$656,176,000	\$653,673,000
Rescission				(\$11,420,000)
Supplemental				\$3,416,000
2009	\$642,875,000	\$664,980,000	\$660,767,000	\$662,820,000
2010	\$684,257,000	\$695,497,000	\$683,149,000	\$689,781,000
2011	\$707,339,000		\$706,227,000	
2012	\$700,537,000			

Justification of Budget Request

National Institute of Environmental Health Sciences

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

Budget Authority (BA):

	FY 2010 Actual	FY 2011 Continuing Resolution	FY 2012 Budget Request	FY 2012 +/- FY 2010
BA	\$689,446,000	\$689,194,000	\$700,537,000	+11,091,000
FTE	666	667	667	+1

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

Director's Overview

The health of the American people is dependent on the interaction of many factors such as adequate nutrition, healthy behaviors, and access to comprehensive, quality, evidence-based health care. There is indisputable evidence of a profound impact of the overall environment on health, beyond these lifestyle factors. It is possible to do all the right things – eat right, exercise, avoid tobacco, etc. – and still be at risk of disease from exposure to environmental agents such as air pollution, metals like lead and mercury, and synthetic chemicals like pesticides and flame retardants that are introduced into our environment, often for useful purposes, but which turn out to have unforeseen effects on people's health.

Scientific discovery about these environmental agents and their effects on human health is the mission of the National Institute of Environmental Health Sciences (NIEHS) and plays a key role in the overall NIH mission to improve health. Through NIEHS's research investments, we learn about new ways to keep Americans healthy by reducing exposure and preventing disease. Moreover, we can point to health success stories built on our science that do not involve increases in health care spending, including removal of lead in gasoline, establishment of air quality standards, reduced levels of arsenic in drinking water, and industrial hygiene standards that protect workers from occupational exposure. These and many other public health actions have prevented or will prevent hundreds of thousands of cases of disease and dysfunction. NIEHS research provided much of the scientific basis for these public health measures and is one way in which NIEHS science contributes to the NIH initiative for enhancing the evidence base for health-related decisions: improved health and reduced incidence of disease through effective prevention strategies.

NIEHS also supports the NIH initiative for using technologies to accelerate discovery. As we move fully into the genomics era, such comprehensive and transformative approaches are revolutionizing environmental health science. Instead of focusing solely on a single gene or protein, we see the effects of environmental agents at a system-wide level – on the entire genome, or proteome (all the proteins viewed together), or transcriptome (the total expression of

all the genes). Instead of picking one gene to see whether its expression is altered by exposure to a chemical, researchers can use automated microchip technology to see changes in the expression of hundreds or thousands of genes at a time. The emerging science of epigenetics, which is the study of changes to the packaging of the DNA that influences the expression of genes, is providing another way to view system-wide effects. NIEHS-funded researchers are investigating the epigenome – the total chemical changes to DNA that do not include sequence changes – including subsets of the epigenome such as the methylome (all the methylated sites on the DNA). These approaches show promise for unraveling some of the causes of some of the most intractable health problems. For example, researchers are using a combination of genetic, epigenetic, and environmental information to uncover new insights into the causes of autism. These technologies also contribute to the NIH initiative for re-engineering the therapeutic development pipeline.

New technologies are also being used to improve our ability to assess environmental exposures. Environmental research has long been hampered by an incomplete set of tools for measuring the dose of an exposure; frequently, investigators must estimate dose from other information such as external levels of air pollution or questionnaire data in which subjects are asked to remember what they ate or where they lived. Now researchers are learning how to use new tools to improve measurement of environmental exposure. This work was initiated under the Exposure Biology Program of the trans-NIH Genes, Environment and Health Initiative and is showing some impressive results. The “metabolome” (measurement of total metabolites) is being investigated by researchers using a mouse model that recapitulates the features of human liver damage associated with alcohol. Results are showing alterations in metabolites and genes involved in fatty acid metabolism as a result of acute and long-term alcohol exposure. Other researchers are investigating the “adductome,” using a mass spectrometry approach to profile all the chemical adducts on albumin in the blood. By comparing all the adducts in smokers and non-smokers, or in leukemia cases and controls, this research is aimed at identifying carcinogens that are associated with either specific exposures (i.e., cigarette smoke) or with leukemia. An exciting project is using breast progenitor cells exposed to estrogenic chemicals to examine how DNA methylation patterns and larger chromosome structures change with exposure. Changes in breast tumors are also being examined to try to detect an epigenomic signature of past exposure to estrogenic chemicals. Working with molecular signatures like these – both identifying them and assessing what they mean for exposure, disease, and prognosis – is a cornerstone for translation of basic science into effective prevention and intervention strategies

Mechanistic research is providing the in-depth understanding of environmental effects on biological processes. One such area of research which is having a broad impact is the study of endocrine disrupting chemicals (EDCs). These chemicals are a group of structurally diverse compounds that can elicit adverse health effects such as hormone dependent cancers, reproductive tract abnormalities, compromised reproductive fitness, and impaired cognitive abilities. A multidisciplinary research collaborative is elucidating the pathways, networks, and signaling cascades perturbed by EDCs using toxicology, molecular biology, endocrinology, multinuclear nuclear magnetic resonance (NMR) spectroscopy, data management, and advanced data analysis to assess fully the potential adverse effects of synthetic and natural EDCs. Several of the joint NIEHS/EPA Children’s Environmental Health Centers (CEHC) and the newer CEHC Formative Research Centers are focusing on the relationship of EDC exposure with behavioral

and cognitive outcomes, pubertal development, and growth in adolescents. Other studies explore the relationship between exposure (including prenatal exposure) and learning disabilities, autism, and attention deficit disorder.

Research at NIEHS also extends to investigating the best ways to reduce exposures that are associated with disease. These efforts affect both disease prevention here at home and also promotion of global health; populations around the world experience adverse health effects due to hazardous exposures that are, in many cases, more severe than exposures in the U.S. For example, NIEHS has invested around \$9 million in research on the health effects of biomass burning and intervention studies in the developing world since 2001. Population studies have documented the associations between indoor air pollution components and health endpoints such as childhood respiratory infections, TB infection in children, low birth weight babies, chronic obstructive pulmonary disease, and other respiratory conditions in adult women.

As part of the NIH initiative for new investigators, new ideas, NIEHS trains and supports a diverse biomedical research community. Overall, the diversity, strength, innovation, and public health relevance of the NIEHS research portfolio underlines the importance of the Institute's role in preventing human disease. Understanding environmental effects on health, identifying strategies to prevent environmentally related disease, and thus reducing the need for expensive diagnosis and treatment, is a major goal in public health and the central mission of NIEHS.

Overall Budget Policy: The FY 2012 request for NIEHS is \$700.537 million, an increase of \$11.091 million, or 1.6 percent over the FY 2010 level. NIEHS will continue to support new investigators and to maintain an adequate number of competing RPGs. In FY 2012, NIEHS is providing a one percent inflationary increase for non-competing grants and a one percent increase in the average cost for competing grants. In addition, NIEHS has targeted a portion of the funds available for competing research project grants to support high priority projects outside of the payline, including awards to new investigators and early stage investigators. The Institute also seeks to maintain a balance between solicitations issued to the extramural community in areas that need stimulation and funding made available to support investigator-initiated projects. Intramural Research and Research Management and Support receive increases to help offset the cost of military pay and other increases.

Funds are included in R&D contracts to reflect NIEHS' share of NIH-wide funding required to support several trans-NIH initiatives, such as the Therapies for Rare and Neglected Diseases program (TRND), the Basic Behavioral and Social Sciences Opportunity Network (OppNet), and support for a new synchrotron at the Brookhaven National Laboratory. For example, each IC that will benefit from the new synchrotron will provide funding to total NIH's commitment to support this new technology--\$10 million.

NIH will provide an across-the-board increase in FY 2012 of four percent for stipends levels under the Ruth L. Kirschstein National Research Service Award training program to continue efforts to attain the stipend levels recommended by the National Academy of Sciences. This will build on the two percent increase in stipend levels for FY 2011. Stipend levels were largely flat for several years, and the requested increase will help to sustain the development of a highly qualified biomedical research workforce.

Program Descriptions and Accomplishments

Clinical and Translational Research: Bench to Bedside to Public Health: This program encourages integration of clinical, population, and community-linked research to translate findings into improved public health practice and disease prevention. A ground-breaking study funded by NIEHS, growing out of the NIH Roadmap Epigenomics Program, is providing clues to understanding how stem cells differentiate. DNA cytosine methylation (the addition of a methyl group to specific cytosine residues of DNA) is a central epigenetic modification that has essential roles in cellular processes including genome regulation, development, and disease. NIEHS-funded researchers published the first genome-wide, single-base-resolution maps of methylated cytosines in a mammalian genome, from human embryonic stem cell lines and from fetal lung fibroblast cell lines, along with comparative analysis of messenger RNA and small RNA components of the transcriptome, several structural modifications of the chromosome, and sites of DNA-protein interaction for several key regulatory factors. Widespread differences were identified in the composition and patterning of cytosine methylation between the stem cells and fibroblast genomes. While most methylated cytosines are part of cytosine-guanine (CG) nucleotide pairs, nearly one-quarter of all cytosine methylations identified in embryonic stem cells were to non-CG cytosines, suggesting that embryonic stem cells may use different methylation mechanisms to affect gene regulation. Non-CG methylation disappeared upon induced differentiation of the embryonic stem cells, and was restored in induced pluripotent stem cells. The researchers identified hundreds of differentially methylated regions close to genes involved in pluripotency and differentiation, and widespread reduced methylation levels in fibroblasts associated with lower transcriptional activity. These reference epigenomes provide a foundation for future studies exploring this key epigenetic modification in human disease and development.

Budget Policy: The FY 2012 budget estimate for this program is \$201.787 million, an increase of \$22.381 million, or 12.5 percent over the FY 2010 level. Research will be used to support a variety of clinical and translational research activities, including the new translational research consortia and studies in epigenomics of human health and disease.

Program Portrait: Following Up on the Gulf Oil Spill

FY 2010 Level: [\$0.2 million]

FY 2012 Level: [\$6.7 million]

On April 20, 2010, the Deepwater Horizon drilling rig in the Gulf of Mexico exploded and sank, killing 11 rig workers and triggering the largest accidental marine oil spill in the history of the petroleum industry. Over the months of the spill, and with the cleanup efforts still ongoing, questions have arisen about the health effects of exposure to the oil spill and to the chemicals employed to disperse and clean it. NIEHS has three distinct efforts to address the health effects of the Deepwater Horizon Gulf Oil Spill. First, with funding from the NIH Director's Office and Common Fund, NIEHS has embarked on a prospective cohort study of clean-up workers exposed to the oil spill, called the Gulf Long-term Follow-up (GuLF) study. NIEHS has been working with numerous federal agencies and the Institute of Medicine to obtain input into the design and implementation of the study. Second, NIEHS, in partnership with several other NIH Institutes/Centers/Offices, has published a Request for Applications (RFA) to examine the impacts of the Deepwater Horizon disaster on the health and quality of life of the general population residing in the Gulf Coast Region. The intent of this RFA is to create one or more community-based participatory consortia of university-community partners to address the health issues of concern to the residents.

By developing multi-project programs that may include population and associated laboratory-based research projects, it is anticipated that the outcomes of these programs will be to understand better the interplay and impact of multiple stressors on human health and well-being and the potential underlying mechanisms for effects observed. In addition, the findings will establish the evidence base needed to inform recovery and to develop strategies to prevent illness and promote the health and well-being of populations in this and future man-made and natural disasters. Third, the National Toxicology Program (NTP) has compiled and reviewed the existing toxicology literature to identify relevant information on hazardous substances that are of concern in the Gulf. The review will help NTP identify any gap areas and plan for additional toxicology studies as needed. In addition, NTP is planning toxicology studies including a mixture of analytical chemistry activities, toxicity pathway screens, and targeted testing in rodent studies to confirm and extend our understanding of the hazards presented by these complex materials.

Toxicity Testing and Evaluation: This program comprises the NIEHS extramural research investment of the NTP, whose mission is to evaluate agents of public health concern, and generate information to be used by health regulatory agencies to make informed decisions affecting public health. NTP also works to develop new and improved test methods, including alternatives to animal testing and methods to test substances faster, in order to disseminate information useful from a public health perspective, more rapidly. For example, NTP, in partnership with the EPA and the NIH Chemical Genomics Center, is evaluating a new toxicity testing process that uses high-speed, automated assays to evaluate tens of thousands of substances for biological activity in key toxicity pathways using human cells and molecular targets instead of animals. If successful, this testing approach will generate data more relevant for humans, help prioritize substances for further testing, expand the number of environmental substances that can be tested, reduce animal use, and have widespread applicability, including use in regulatory safety testing. In July 2010, the Food and Drug Administration (FDA) joined this collaboration, bringing access to important information on failed drug candidates, giving the program an anchor in adverse human health effects, and allowing better comparisons of toxicity signatures across species.

Budget Policy: The FY 2012 budget estimate for this program is \$85.359 million, an increase of \$3.132 million, or 3.8 percent over the FY 2010 level. Resources in this program are supporting novel toxicology methods to improve our ability to assess risk and to understand toxic effects at the cellular and molecular level.

Basic Mechanisms in Human Biology: Environmental toxicants can interrupt normal biological processes and initiate events leading to disease. This Basic Mechanisms in Human Biology program employs environmental toxicants as laboratory probes to study the complex molecular pathways that lead to chronic disease, identifies methods to diagnose these diseases before they are clinically evident, and develops early interventions to prevent progression to end-stage disease. An international research team with funding from NIEHS has discovered a novel mechanism that may explain the heart attacks and strokes suffered by some long-term, high-dosage users of the arthritis drug Vioxx. This groundbreaking discovery may lead to safer drugs for millions of people who suffer chronic pain. The team employed metabolomic profiling to analyze the plasma of laboratory mice given Vioxx. They found dramatic accumulations of an arachidonic acid metabolite known as 20-HETE. The metabolite is known to be a potent vasoconstrictor and high levels of it could cause increases in the risk of heart attack and stroke. The research team believes that similar increases might be seen with other non-steroidal anti-inflammatory drugs. Vioxx was pulled from the marketplace in 2004 after reports of heart

attacks and strokes in patients taking the drug. It had been used by millions of people worldwide and showed great promise for disease and conditions marked by chronic pain and inflammation such as arthritis. The UC Davis scientists believe that their findings will open new paths for developing safer COX2 inhibitors. Agents that reduce the circulating levels of 20-HETE, while providing the same pain relief, may reduce the risk of adverse cardiovascular events.

Budget Policy: The FY 2012 budget estimate for this program is \$121.692 million, a decrease of \$23.593 million, or 16.2 percent from the FY 2010 level. In large part, this decrease represents the completion of several earlier initiatives.

Program Portrait: Measuring DNA Repair Capacity Across Populations

FY 2010 Level: [\$0.0 million]

FY 2012 Level: [\$0.9 million]

DNA damage occurs following exposure to myriad environmental agents including polycyclic aromatic hydrocarbons, UV irradiation, chromate, arsenic, dietary components such as nitrosamines and heterocyclic aromatic amines, and reactive oxygen and nitrogen species. DNA damage has been implicated in processes of aging as well as development of cancer and other diseases. The primary defense mechanisms against the genotoxic consequences of these exposures are DNA repair and DNA damage tolerance pathways. NIEHS has invested extensively in research in the mechanisms of cellular responses to DNA damage, setting the stage for translation of basic mechanistic understanding into studies that are designed to identify susceptible populations, based on variability in exposures and DNA repair capacity, and to improve prevention and treatment strategies for a variety of diseases including neurodegenerative diseases and cancer. Research on DNA damage and DNA repair mechanisms has already yielded important public health benefits through the contribution of this research to the characterization of genetically toxic chemicals. This knowledge led to some of the most effective early screening techniques for cancer-causing agents and to the prevention of cancer through reduction of many genotoxic chemicals in the environment, such as butadiene, benzene, and urethane. However, population studies of DNA repair capacity have been hindered by the lack of quantitative tools to measure DNA repair capacity at the population level. New research is being funded by NIEHS to support the development of medium to high throughput assays and technology that can be scaled up to measure the responses to DNA damaging agents across an entire study population in an epidemiological or clinical study. Development of tools to measure the responses to DNA damaging agents will support collaborations among laboratory, epidemiology, and clinical investigators that are needed to identify individuals and sub-populations at risk due to differential exposures or DNA repair capacity.

Program Portrait: Human Health Effects of Bisphenol A

FY 2010 Level: [\$14.8 million]

FY 2012 Level: [\$17.0 million]

The Human Health Effects of Bisphenol A (BPA) program supports research to determine the potential adverse health effects of exposure to this chemical, typically found in mobile phone housings, household items, automobiles, the linings of food cans, bottle tops, and water supply pipes. BPA is one of the highest volume chemicals produced worldwide, and one to which humans are thought to be almost universally exposed. Since BPA migrates from food and beverage containers into the things we consume, the most frequent human exposure to BPA is from diet. The 2003-2004 National Health and Nutrition Examination Survey (NHANES III) found detectable levels of BPA in 93% of urine samples from people 6 years of age and older. The highest estimated daily intake of BPA occurs in infants and children, who may metabolize BPA less efficiently than adults. Preliminary data in animals indicates that even low doses of BPA during development may result in effects that persist throughout life, causing disease and dysfunction, such as prostate and breast cancer, obesity, and cardiac effects, many years or even decades later. NIEHS has been a leader in supporting toxicological and epidemiologic

research on the health effects of BPA. NIEHS has taken steps to help with the effort to fill significant data gaps in a risk assessment of BPA conducted by the FDA, which regulates dietary exposures to BPA, and improve the knowledge base on this chemical's health impacts. NIEHS used funds from the American Recovery and Reinvestment Act (ARRA) Grand Opportunity program to launch animal and human studies to investigate gaps in the data on health effects of BPA in specific organ systems identified in the FDA assessment. Studies examined whether prenatal and early-life exposure to BPA was associated with increased lung wheeze, airway inflammation, and asthma; how developmental exposure to BPA may affect the development of the immune system; and effects of developmental exposure to BPA on brain development and cognitive skills, physical activity, gender-specific play, and social behaviors. Investigators are adding more animals and sharing tissue samples through collaborations to increase the number of endpoints studied, and comparisons of human and animal work are ongoing as results become available. The NTP and NIEHS extramural division recently created a funding opportunity to develop a unique consortium of extramural investigators who will work with NTP and the National Center for Toxicological Research to expand the endpoints that can be investigated through a 2-year bioassay study of BPA. Collaborations such as these expand and enhance the utility of science produced through the NIEHS grants program, and also provide new and better scientific data to the regulatory process in order to protect the public health.

Exposure Biology/Exposure Measurement: This program seeks to develop improved methods to detect and measure environmental exposures sustained by humans or other organisms. NIEHS-supported researchers at the Wyss Institute for Biologically Inspired Engineering at Harvard University have developed a device that mimics a living and breathing human lung on a microchip roughly the size of a quarter. The device has the potential to be a valuable research tool for testing the effects of environmental agents, and the absorption, safety and efficacy of drug candidates; under existing methodologies, testing of a single substance can cost more than \$2 million. The lung-on-a-chip device uses a new approach to tissue engineering which places tissue from the lining of the alveoli and the blood vessels that surround them across a porous membrane. Air flows across the lung cells while culture medium, mimicking blood, is pumped through the capillaries. Mechanical stretching of the device mimics the expansion and contraction of the lungs during breathing. The researchers tested the device by introducing *E. coli* bacteria on the lung cell side of the device while allowing white blood cells to flow through the capillaries. The lung cells detected the bacteria, and through the porous membrane, activated the blood vessel cells, which caused an immune response resulting in the white blood cells movement to the air chamber where they killed the bacteria. The investigators are following up these studies with others to test the gas exchange capacity of the device. The team is also working to build other model systems to mimic the intestinal system, bone marrow, and cancer models.

Budget Policy: The FY 2012 budget estimate for this program is \$26.680 million, an increase of \$502 thousand, or 1.9 percent over the FY 2010 level. The work in the Exposure Biology/Exposure Measurement program is proceeding to the point where plans for FY2012 and beyond call for validation and field testing of the new exposure assessment tools and biomarkers that have been identified through previous work.

Pathways for Future Environmental Health Scientists: This program's goal is to attract the brightest young students and scientists into the environmental health sciences field to have the right cadre to conduct the interdisciplinary research demanded. This program includes efforts at the high school and undergraduate levels (opportunities for laboratory-based training), the graduate level (institutional and individual training grants), and the faculty level (grants for young investigators and short term sabbatical awards). An exciting new program tailors awards for the transition of a postdoctoral researcher into his or her own laboratory as an independent

investigator. One such researcher, supported by NIEHS, has identified a new biomarker for kidney toxicology that could lead to better and faster diagnosis of kidney injury. This finding has clinical applications as well as potentially serving as a marker for screening potential new drugs for early nephrotoxicity.

Budget Policy: The FY 2012 budget estimate for this program is \$51.685 million, an increase of \$2 thousand, or about the same as the FY 2010 level. Resources will be used to continue ongoing training programs at undergraduate, doctoral, postdoctoral, and early- and mid-career levels.

Intramural Research: This program's mission is to investigate the role of environmental agents in human disease and dysfunction and define the important biological and chemical processes that these agents affect. NIEHS intramural research studies are often longitudinal and high-risk in nature with unique components, such as NIEHS's contribution to the NTP, epidemiological studies of environmentally associated diseases and of environmental exposures (including the new study of individuals exposed by the Gulf oil spill), and intervention and prevention studies in humans to reduce the effects of exposures to hazardous environments. The opening of the NIEHS Clinical Research Unit provides new opportunities for clinical and basic scientists in the Intramural Program to collaborate and learn how environmental exposures influence human health and disease. Thus, new knowledge in cell and molecular biology is being translated into the field of molecular medicine (bench to bedside). Glucocorticoids are stress-induced steroids that also function as anti-inflammatory and immunosuppressive effectors. Synthetic glucocorticoids are widely used in the treatment of many inflammatory and autoimmune diseases; these drugs are prescribed largely without consideration of patient gender. NIEHS intramural researchers recently identified multiple signaling pathways in liver that are related to the innate immune response and that are altered by glucocorticoids in a gender-specific manner. Glucocorticoids regulated more genes in males than females and experiments using a sepsis-based model of liver inflammation showed that the anti-inflammatory effects of glucocorticoids are indeed greater in males. These findings suggest gender-based differences in anti-inflammatory therapy with glucocorticoids and imply that failure to mount an adequate glucocorticoid response to autoimmune challenge may underlie the higher incidence of certain autoimmune diseases observed in females, such as rheumatoid arthritis and systemic lupus erythematosus.

Budget Policy: The FY 2012 budget estimate for this program is \$189.335 million, an increase of \$7.321 million, or 4.0 percent over the FY 2010 level. Resources will be used to support the increasing demand for bioinformatics in high-throughput screening, toxicogenomics, epigenomics, systems biology and database integration.

Research Management and Support (RMS): The RMS program provides administrative, budgetary, logistical and scientific support in the review, award, and monitoring of research grants and training awards. NIEHS currently oversees approximately 773 research grants and centers. In addition, RMS provides administrative support for the Intramural Research program. Other RMS functions include strategic planning, coordination, and evaluation of NIEHS programs, regulatory compliance, ethics, and liaison with other Federal agencies, Congress, and the public.

Budget Policy: The FY 2012 budget estimate for this program is \$23.999 million, an increase of \$1.346 million, or 5.9 percent over the FY 2010 level. Resources will support increased liaison functions with other government agencies and non-government organizations to improve interagency collaboration and efficiency and optimize use of resources.

NIH Common Fund

NIEHS is a co-lead institute for the Roadmap Epigenomics Program supported through the NIH Common Fund, which will continue in FY 2012.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Authority by Object
(Dollars in Thousands)

	FY 2010 Actual	FY 2012 PB	Increase or Decrease	Percent Change
Total compensable workyears:				
Full-time employment	666	667	1	0.2%
Full-time equivalent of overtime and holiday hours	1	1	0	0.0%
Average ES salary	\$0	\$165,300	\$165,300	0.0%
Average GM/GS grade	11.4	11.4	0.0	0.0%
Average GM/GS salary	\$83,516	\$85,019	\$1,503	1.8%
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$94,561	\$96,074	\$1,513	1.6%
Average salary of ungraded positions	124,624	126,272	1,648	1.3%
OBJECT CLASSES	FY 2010 Actual	FY 2012 Estimate	Increase or Decrease	Percent Change
Personnel Compensation:				
11.1 Full-time permanent	\$40,502	\$41,127	\$625	1.5%
11.3 Other than full-time permanent	19,686	19,757	71	0.4%
11.5 Other personnel compensation	1,291	1,310	19	1.5%
11.7 Military personnel	921	958	37	4.0%
11.8 Special personnel services payments	9,927	9,930	3	0.0%
Total, Personnel Compensation	\$72,327	\$73,082	\$755	1.0%
12.0 Personnel benefits	\$18,098	\$18,306	\$208	1.1%
12.2 Military personnel benefits	820	834	14	1.7%
13.0 Benefits for former personnel	0	0	0	0.0%
Subtotal, Pay Costs	\$91,245	\$92,222	\$977	1.1%
21.0 Travel and transportation of persons	\$2,198	\$2,584	\$386	17.6%
22.0 Transportation of things	533	635	102	19.1%
23.1 Rental payments to GSA	0	0	0	0.0%
23.2 Rental payments to others	66	79	13	19.7%
23.3 Communications, utilities and miscellaneous charges	1,079	1,293	214	19.8%
24.0 Printing and reproduction	52	61	9	17.3%
25.1 Consulting services	1,080	1,146	66	6.1%
25.2 Other services	34,766	33,025	(1,741)	-5.0%
25.3 Purchase of goods and services from government accounts	100,904	110,195	9,291	9.2%
25.4 Operation and maintenance of facilities	5,113	6,134	1,021	20.0%
25.5 Research and development contracts	96,263	88,765	(7,498)	-7.8%
25.6 Medical care	129	155	26	20.2%
25.7 Operation and maintenance of equipment	4,000	4,795	795	19.9%
25.8 Subsistence and support of persons	0	0	0	0.0%
25.0 Subtotal, Other Contractual Services	\$242,255	\$244,215	\$1,960	0.8%
26.0 Supplies and materials	\$12,600	\$15,098	\$2,498	19.8%
31.0 Equipment	9,061	10,862	1,801	19.9%
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	330,355	333,486	3,131	0.9%
42.0 Insurance claims and indemnities	0	0	0	0.0%
43.0 Interest and dividends	2	2	0	0.0%
44.0 Refunds	0	0	0	0.0%
Subtotal, Non-Pay Costs	\$598,201	\$608,315	\$10,114	1.7%
Total Budget Authority by Object	\$689,446	\$700,537	\$11,091	1.6%

Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2010 Actual	FY 2012 PB	Increase or Decrease
Personnel Compensation:			
Full-time permanent (11.1)	\$40,502	\$41,127	\$625
Other than full-time permanent (11.3)	19,686	19,757	71
Other personnel compensation (11.5)	1,291	1,310	19
Military personnel (11.7)	921	958	37
Special personnel services payments (11.8)	9,927	9,930	3
Total Personnel Compensation (11.9)	\$72,327	\$73,082	\$755
Civilian personnel benefits (12.1)	\$18,098	\$18,306	\$208
Military personnel benefits (12.2)	820	834	14
Benefits to former personnel (13.0)	0	0	0
Subtotal, Pay Costs	\$91,245	\$92,222	\$977
Travel (21.0)	\$2,198	\$2,584	\$386
Transportation of things (22.0)	533	635	102
Rental payments to others (23.2)	66	79	13
Communications, utilities and miscellaneous charges (23.3)	1,079	1,293	214
Printing and reproduction (24.0)	52	61	9
Other Contractual Services:			
Advisory and assistance services (25.1)	1,080	1,146	66
Other services (25.2)	34,766	33,025	(1,741)
Purchases from government accounts (25.3)	60,697	63,726	3,029
Operation and maintenance of facilities (25.4)	5,113	6,134	1,021
Operation and maintenance of equipment (25.7)	4,000	4,795	795
Subsistence and support of persons (25.8)	0	0	0
Subtotal Other Contractual Services	\$105,656	\$108,826	\$3,170
Supplies and materials (26.0)	\$12,596	\$15,093	\$2,497
Subtotal, Non-Pay Costs	\$122,180	\$128,571	\$6,391
Total, Administrative Costs	\$213,425	\$220,793	\$7,368

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Details of Full-Time Equivalent Employment (FTEs)

OFFICE/DIVISION	FY 2010 Actual			FY 2011 CR			FY 2012 PB		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director	39	1	40	39	2	41	39	2	41
Division of Intramural Research	443	6	449	443	6	449	443	6	449
Division of Extramural Research and Training	55		55	55		55	55		55
Office of Management	105	2	107	105	2	107	105	2	107
Office of Translational Research	15		15	15		15	15		15
Total	657	9	666	657	10	667	657	10	667
Includes FTEs which are reimbursed from the NIH Common Fund for Medical Research									
FTEs supported by funds from Cooperative Research and Development Agreements									
	0	0							0
FISCAL YEAR	Average GM/GS Grade								
2008	11.2								
2009	11.3								
2010	11.4								
2011	11.4								
2012	11.4								

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Detail of Positions

GRADE	FY 2010 Actual	FY 2011 CR	FY 2012 PB
Total, ES Positions	0	1	1
Total, ES Salary	0	165,300	165,300
GM/GS-15	43	43	43
GM/GS-14	58	58	58
GM/GS-13	83	83	83
GS-12	93	93	93
GS-11	105	105	105
GS-10	2	2	2
GS-9	67	67	67
GS-8	17	17	17
GS-7	22	22	22
GS-6	2	2	2
GS-5	1	1	1
GS-4	10	10	10
GS-3	4	4	4
GS-2	2	2	2
GS-1	0	0	0
Subtotal	509	509	509
Grades established by Act of July 1, 1944 (42 U.S.C. 207):			
Assistant Surgeon General	1	1	1
Director Grade	5	5	5
Senior Grade	2	2	2
Full Grade	2	2	2
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	10	10	10
Ungraded	226	226	226
Total permanent positions	503	504	504
Total positions, end of year	695	696	696
Total full-time equivalent (FTE) employment, end of year	666	667	667
Average ES salary	0	165,300	165,300
Average GM/GS grade	11.4	11.4	11.4
Average GM/GS salary	83,516	84,351	85,019

**NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences**

New Positions Requested

	FY 2012		
	Grade	Number	Annual Salary
Executive Officer	SES	1	\$165,300
Total Requested		1	