

Department of Health and Human Services
National Institutes of Health

Overall Appropriations

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National Institutes of Health
FY 2015 Congressional Justification

FY 2015 Appropriations Language

NATIONAL CANCER INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to cancer, **[\$4,923,238,000]***\$4,930,715,000*, of which up to \$8,000,000 may be used for facilities repairs and improvements at the National Cancer Institute—Frederick Federally Funded Research and Development Center in Frederick, Maryland.

NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to cardiovascular, lung, and blood diseases, and blood and blood products, **[\$2,988,605,000]***\$2,987,685,000*.

NATIONAL INSTITUTE OF DENTAL AND CRANIOFACIAL RESEARCH

For carrying out section 301 and title IV of the PHS Act with respect to dental and craniofacial diseases, **[\$398,650,000]***\$397,131,000*.

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

For carrying out section 301 and title IV of the PHS Act with respect to diabetes and digestive and kidney disease, **[\$1,744,274,000]***\$1,743,336,000*.

NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE

For carrying out section 301 and title IV of the PHS Act with respect to neurological disorders and stroke, **[\$1,587,982,000]***\$1,608,461,000*.

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

For carrying out section 301 and title IV of the PHS Act with respect to allergy and infectious diseases, **[\$4,358,841,000]***\$4,423,357,000*.

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to general medical

sciences, ~~【\$2,364,147,000】~~\$2,368,877,000~~【:Provided, That not less than \$273,325,000 is provided for the Institutional Development Awards program】~~.

EUNICE KENNEDY SHRIVER NATIONAL INSTITUTE OF CHILD HEALTH
AND HUMAN DEVELOPMENT

For carrying out section 301 and title IV of the PHS Act with respect to child health and human development, ~~【\$1,282,595,000】~~\$1,283,487,000.

NATIONAL EYE INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to eye diseases and visual disorders, ~~【\$682,077,000】~~\$675,168,000.

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to environmental health sciences, ~~【\$665,439,000】~~\$665,080,000.

For necessary expenses ~~【for】~~ of the National Institute of Environmental Health Sciences in carrying out activities set forth in section 311(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C.9660(a)) and section 126(g) of the Superfund Amendments and Reauthorization Act of 1986, ~~【\$77,349,000】~~\$77,349,000.

NATIONAL INSTITUTE ON AGING

For carrying out section 301 and title IV of the PHS Act with respect to aging, ~~【\$1,171,038,000】~~\$1,170,880,000.

NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND
SKIN DISEASES

For carrying out section 301 and title IV of the PHS Act with respect to arthritis and musculoskeletal and skin diseases, ~~【\$520,053,000】~~\$520,189,000.

NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION
DISORDERS

For carrying out section 301 and title IV of the PHS Act with respect to deafness and other communication disorders, ~~【\$404,049,000】~~\$403,933,000.

NATIONAL INSTITUTE OF NURSING RESEARCH

For carrying out section 301 and title IV of the PHS Act with respect to nursing research, **【\$140,517,000】***\$140,452,000.*

NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM

For carrying out section 301 and title IV of the PHS Act with respect to alcohol abuse and alcoholism, **【\$446,025,000】***\$446,017,000.*

NATIONAL INSTITUTE ON DRUG ABUSE

For carrying out section 301 and title IV of the PHS Act with respect to drug abuse, **【\$1,025,435,000】***\$1,023,268,000.*

NATIONAL INSTITUTE OF MENTAL HEALTH

For carrying out section 301 and title IV of the PHS Act with respect to mental health, **【\$1,446,172,000】***\$1,440,076,000.*

NATIONAL HUMAN GENOME RESEARCH INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to human genome research, **【\$497,813,000】***\$498,451,000.*

NATIONAL INSTITUTE OF BIOMEDICAL IMAGING AND
BIOENGINEERING

For carrying out section 301 and title IV of the PHS Act with respect to biomedical imaging and bioengineering research, **【\$329,172,000】***\$328,532,000.*

NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE
MEDICINE

For carrying out section 301 and title IV of the PHS Act with respect to complementary and alternative medicine, **【\$124,296,000】***\$124,509,000.*

NATIONAL INSTITUTE ON MINORITY HEALTH AND HEALTH
DISPARITIES

For carrying out section 301 and title IV of the PHS Act with respect to minority health and health disparities research, **【\$268,322,000】***\$267,953,000.*

JOHN E. FOGARTY INTERNATIONAL CENTER

For carrying out the activities of the John E. Fogarty International Center (described in subpart 2 of part E of title IV of the PHS Act), ~~[\$67,577,000]~~\$67,776,000.

NATIONAL LIBRARY OF MEDICINE

For carrying out section 301 and title IV of the PHS Act with respect to health information communications, ~~[\$327,723,000,]~~ \$372,851,000: *Provided, That of the amounts available for improvement of information systems, [of which]\$4,000,000 shall be available ~~[until]~~ *through* September 30, ~~[2015]~~ 2016~~[, for improvement of information systems]~~: *Provided further,* That in fiscal year ~~[2014]~~2015, the National Library of Medicine may enter into personal services contracts for the provision of services in facilities owned, operated, or constructed under the jurisdiction of the National Institutes of Health (referred to in this title as "NIH"): *Provided further,* That in addition to amounts provided herein, \$8,200,000 shall be available from amounts available under section 241 of the PHS Act to carry out the purposes of the National Information Center on Health Services Research and Health Care Technology established under section 478A of the PHS Act and related health information services.*

NATIONAL CENTER FOR ADVANCING TRANSLATIONAL SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to translational sciences, ~~[\$633,267,000]~~\$657,471,000: *Provided,* That up to ~~[\$9,835,000]~~\$29,810,000 shall be available to implement section 480 of the PHS Act, relating to the Cures Acceleration Network~~[:~~*Provided further,* That at least \$474,746,000 is provided to the Clinical and Translational Sciences Awards program].

OFFICE OF THE DIRECTOR

For carrying out the responsibilities of the Office of the Director, NIH, ~~[\$1,400,134,000]~~\$1,451,786,000, of which up to ~~[\$25,000,000]~~ \$30,000,000 shall be used to carry out section ~~[213]~~ 212 of this Act: *Provided,* That funding shall be available for the purchase of not to exceed 29 passenger motor vehicles for replacement only: *Provided further,* That NIH is authorized to collect third-party payments for the cost of clinical services that are incurred in NIH research facilities and that such payments shall be credited to the NIH

Management Fund: *Provided further*, That all funds credited to the NIH Management Fund shall remain available for one fiscal year after the fiscal year in which they are deposited: *Provided further*, That \$165,000,000 shall be for the National Children's Study ("NCS"), except that not later than July 15, ~~2014~~2015, the Director shall estimate the amount needed for the NCS during fiscal year ~~2014~~2015, and any funds in excess of the estimated need shall be transferred to and merged with the accounts for the various Institutes and Centers in proportion to their shares of total NIH appropriations made by this Act: *Provided further*, That ~~533,039,000~~583,039,000 shall be available for the Common Fund established under section 402A(c)(1) of the PHS Act: *Provided further*, That of the funds provided \$10,000 shall be for official reception and representation expenses when specifically approved by the Director of the NIH: *Provided further*, That the Office of AIDS Research within the Office of the Director of the NIH may spend up to \$8,000,000 to make grants for construction or renovation of facilities as provided for in section 2354(a)(5)(B) of the PHS Act: *Provided further*, That the Director may direct up to 1 percent of the total made available in this or any other Act to all National Institutes of Health appropriations to activities that the Director may so designate: *Provided further*, That no such appropriation shall be decreased by more than 1 percent by any such transfers and that the Congress is promptly notified of the transfer.

BUILDINGS AND FACILITIES

For the study of, construction or demolition of, renovation of, and acquisition of equipment for, facilities of or used by NIH, including the acquisition of real property, ~~128,663,000~~ \$128,663,000, to remain available until ~~September 30, 2018~~ expended ~~7,000,000~~, of which up to \$7,000,000 may be used for demolition].

2015 GENERAL PROVISIONS

SEC. [203] 202. None of the *discretionary* funds appropriated in this title shall be used to pay the salary of an individual, through a grant or other extramural mechanism, at a rate in excess of Executive Level II.

SEC. [204] 203. None of the funds appropriated in this Act may be expended pursuant to section 241 of the PHS Act, except for funds specifically provided for in this Act, or for other taps and assessments made by any office located in HHS, prior to the preparation and submission of a report by the Secretary to the Committees on Appropriations of the House of Representatives and the Senate detailing the planned uses of such funds.

SEC. [205] 204. Notwithstanding section 241(a) of the PHS Act, such portion as the Secretary shall determine, but not more than [2.5] 3.0 percent, of any amounts appropriated for programs authorized under such Act shall be made available for the evaluation (directly, or by grants or contracts) and the implementation and effectiveness of programs funded in this title.

SEC. [206] 205. Not to exceed 1 percent of any discretionary funds (pursuant to the Balanced Budget and Emergency Deficit Control Act of 1985) which are appropriated for the current fiscal year for HHS in this Act may be transferred between appropriations, but no such appropriation shall be increased by more than 3 percent by any such transfer: Provided, That the transfer authority granted by this section shall not be used to create any new program or to fund any project or activity for which no funds are provided in this Act: Provided further, That the Committees on Appropriations of the House of Representatives and the Senate are notified at least 15 days in advance of any transfer.

(TRANSFER OF FUNDS)

SEC. [207] 206. The Director of the NIH, jointly with the Director of the Office of AIDS Research, may transfer up to 3 percent among institutes and centers from the total amounts identified by these two Directors as funding for research pertaining to the human immunodeficiency virus: Provided, That the Committees on Appropriations of the House of Representatives and the Senate are notified at least 15 days in advance of any transfer.

(TRANSFER OF FUNDS)

SEC. [208] 207. Of the amounts made available in this Act for NIH, the amount for research related to the human immunodeficiency virus, as jointly determined by the Director of NIH and the Director of the Office of AIDS Research, shall be made available to the "Office of AIDS Research" account. The Director of the Office of AIDS Research shall transfer from such account amounts necessary to carry out section 2353(d)(3) of the PHS Act.

SEC. [213] 212. (a) AUTHORITY.—Notwithstanding any other provision of law, the Director of NIH ("Director") may use funds available under section 402(b)(7) or 402(b)(12) of the PHS

Act to enter into transactions (other than contracts, cooperative agreements, or grants) to carry out research identified pursuant to such section 402(b)(7) (pertaining to the Common Fund) or research and activities described in such section 402(b)(12).

(b) PEER REVIEW.—In entering into transactions under subsection (a), the Director may utilize such peer review procedures (including consultation with appropriate scientific experts) as the Director determines to be appropriate to obtain assessments of scientific and technical merit. Such procedures shall apply to such transactions in lieu of the peer review and advisory council review procedures that would otherwise be required under sections 301(a)(3), 405(b)(1)(B), 405(b)(2), 406(a)(3)(A), 492, and 494 of the PHS Act.

SEC. [215] 214. Not to exceed \$45,000,000 of funds appropriated by this Act to the institutes and centers of the National Institutes of Health may be used for alteration, repair, or improvement of facilities, as necessary for the proper and efficient conduct of the activities authorized herein, at not to exceed \$3,500,000 per project.

(TRANSFER OF FUNDS)

SEC. [216] 215. Of the amounts made available for NIH, 1 percent of the amount made available for National Research Service Awards ("NRSA") shall be made available to the Administrator of the Health Resources and Services Administration to make NRSA awards for research in primary medical care to individuals affiliated with entities who have received grants or contracts under section 747 of the PHS Act, and 1 percent of the amount made available for NRSA shall be made available to the Director of the Agency for Healthcare Research and Quality to make NRSA awards for health service research.

**National Institutes of Health
FY 2015 Congressional Justification**

Language Analysis

Language Provision	Explanation
[Provided, That not less than \$273,325,000 is provided for the Institutional Development Awards program.]	Recommend the language be removed because it is no longer necessary.
National Library of Medicine: “ <i>Provided, That of the amounts available for improvement of information systems, [of which] \$4,000,000 shall be available [until] through September 30, [2015] 2016 [, for improvement of information systems]: Provided further, That in fiscal year [2014]2015, the National Library of Medicine may enter into personal services contracts....</i> ”	Updates year reference to ensure continuation of two-year funding availability and personal services contracts. Proposed language change clarifies that this \$4 million level is meant to be a ceiling only for the purposes of the two-year funding availability.
[Provided further, That at least \$474,746,000 is provided to the Clinical and Translational Sciences Awards program]	Recommend the language be removed because it is no longer necessary.
<i>Provided further, that the Director may direct up to 1 percent of the total made available in this or any other Act to all National Institutes of Health appropriations to activities that the Director may so designate: Provided further, That no such appropriation shall be decreased by more than 1 percent by any such transfers and that the Congress is promptly notified of the transfer.</i>	Provision provides appropriations clarity regarding the NIH Director’s ability to use 1 percent transfer authority, as provided in authorizing language.
Office of the Director: “of which up to [\$25,000,000] \$30,000,000 shall be used to carry out section [213] 212 of this Act....”	Updates amount for Other Transaction Authority due to new DARPA-like program proposed for the Common Fund.
Building and Facilities: “...to remain available until [September 30, 2018] expended....”	The Consolidated Appropriations Act, 2012 (P.L. 112-74) changed “expended” to “September 30, 2015.” NIH proposes reverting back to the previous language to provide NIH maximum flexibility to administer these resources.

**National Institutes of Health
FY 2015 Congressional Justification**

**Authorizing Legislation
(Dollars in Thousands)**

	FY 2014 Amount Authorized ¹	FY 2014 Appropriations Act	FY 2015 Amount Authorized ¹	FY 2015 President's Budget
National Institutes of Health:				
Sec 301 and Title IV of the PHS Act	\$29,926,104	\$29,926,104	\$30,126,104	\$30,126,104
Section 330B(b)(2) of the PHS Act ²	\$150,000	\$139,200 ³	\$150,000	\$150,000
Section 311(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and Section 126(g) of the Superfund Amendments and Reauthorization Act of 1986	\$77,349	\$77,349	\$77,349	\$77,349

¹ Explicit authorization levels for NIH expired at the end of FY 2009.

² This represents a mandatory appropriation, for which FY 2014 was authorized and appropriated in the American Taxpayers Relief Act of 2012 (P.L. 112-240), and for which reauthorization is proposed for FY 2015.

³ Post-sequester

NATIONAL INSTITUTES OF HEALTH
Appropriation History¹

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2006	28,740,073,000	28,737,094,000	29,644,804,000	28,461,417,000
2007	28,578,417,000	28,479,417,000 ³	28,779,081,000 ³	29,030,004,000
2008	28,849,675,000	29,899,004,000	30,129,004,000	29,312,311,000
2008 Supp.				150,000,000
2009	29,457,070,000	30,607,598,000	30,404,524,000 ⁶	30,545,098,000
2009 ARRA				10,400,000,000
2010	30,988,000,000	31,488,000,000	30,988,000,000	30,934,413,000
2011	32,136,209,000		31,989,000,000	30,935,000,000
2012	31,979,000,000		30,630,423,000	30,852,187,000
2013	30,852,187,000		30,810,387,000	30,929,977,000
2013 Sequestration				(1,552,593,211)
2014	31,323,187,000		31,176,187,000	30,142,653,000
2015 PB	30,353,453,000			

¹ Does not include comparability adjustments. Superfund and Type 1 diabetes are included except where indicated. Separate appropriation for Superfund Research activities at NIEHS beginning in FY 2001. Includes amounts authorized to the NIDDK for Type 1 diabetes research beginning with the FY 2002 Appropriation.

² Reflects: a) \$2,903,664,000 appropriated to the ICs for HIV research, b) NIH share of Government-wide rescission of \$287,356,000, and c) transfer of \$99,000,000 to the Global Fund for HIV/AIDS, Malaria, and Tuberculosis.

³ Reflects funding levels approved by the Appropriations Committees.

⁴ Reflects: a) \$2,905,802,000 appropriated to the ICs for HIV research, b) add-on for pay cost of \$18,087,000, c) transfer of \$99,000,000 to the Global Fund, and d) Supplemental Bill transfer of \$99,000,000.

⁵ Reflects: a) \$2,928,345,000 appropriated to the ICs for HIV research, b) NIH share of the Government-wide rescission of \$520,929,000, c) transfer of \$294,759,000 to the Global Fund, and d) a supplemental appropriation of \$150,000,000 reflected below.

⁶ Excludes funding for Superfund Research activities for which the Appropriations Committee did not mark up a figure.

⁷ Provided under P.L. 111-5.

⁸ Reflects Labor/HHS appropriation of \$30,705,201,000; transfer of \$300,000,000 to Global AIDS funds; \$1,000,000 transfer from HHS for the Interagency Autism Coordinating Committee and Secretary's 1% transfer to HHS of \$4,587,000.

⁹ Reflects: \$3,059,277,000 appropriated to the ICs for HIV research; \$998,000 transfer from HHS to the Interagency Autism Coordinating Committee.

¹⁰ Reflects: \$3,074,921,000 appropriated to the ICs for HIV research; Omnibus Across-the-Board rescission of \$58,130,567 and the Secretary's transfer of \$8,726,791.

¹¹ Reflects: Full-year continuing resolution base. Does not include Section 3004 OMB 0.2% across the board rescission.

**National Institutes of Health
FY 2015 Congressional Justification**

Appropriations Not Authorized by Law

This is not applicable to NIH.

**National Institutes of Health
FY 2015 Congressional Justification**

Narrative by Activity

**National Institutes of Health
(Dollars in Thousands)**

	FY 2013 Actual	FY 2014 Enacted	FY 2015 President's Budget	FY 2015 Request +/- FY 2014 Enacted
Program Level ¹	\$ 29,151,462	\$ 30,150,853	\$ 30,361,653	\$ 210,800
FTE.....	18,234	18,234	18,234	-

¹ Includes Mandatory Type 1 Diabetes, Superfund and NLM Program Evaluation (\$8.20 million) in FY 2013, FY 2014 and FY 2015.

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

Allocation Method.....Competitive Grant
 Allocation Method.....Contract
 Allocation Method.....Intramural
 Allocation Method.....Other

Program Description and Accomplishments

NIH continues to consider organizational initiatives and reforms to ensure that its structure is optimized. In March 2013, the Scientific Management Review Board (SMRB) voted to approve recommendations for optimizing the NIH Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. SMRB was asked to consider how NIH can support the SBIR/STTR programs in ways that encourage biomedical innovation from small businesses that align with NIH priorities, fund quality proposals yielding the greatest potential for successful commercialization, and leverage existing NIH resources and expertise to enable the success of its grantees. SMRB identified three primary areas in which the programs could be improved. First, the programs should be streamlined to reduce delays in the application, review, and award processes. Second, the programs should place greater emphasis on the selection and support of projects with a high likelihood of commercial success. Third, NIH should increase communication and collaborative efforts across the Institutes and Centers (ICs) in order to share lessons learned and leverage existing resources and expertise. In FY 2014, NIH will consider how best to implement the Board's recommendations.

In December 2013, SMRB approved findings and recommendations on approaches to assess the value of biomedical research supported by NIH. Members recommended that NIH intensify its efforts to assess systematically, comprehensively, and strategically the value of biomedical research for the purposes of accountability, effective management, and public awareness. To do this, SMRB recommended the creation of a trans-NIH committee on assessments that should oversee the selection of study topics, take further steps to standardize and link the data needed to conduct assessments, and coordinate internal and external assessment activities (e.g., grants, contracts). SMRB also advised NIH to use a mix of assessment methodologies, including representative case studies, to capture the value of biomedical research supported across NIH. In FY 2014, NIH will begin to implement these recommendations.

With respect to an earlier recommendation by the SMRB, NIH has decided not to include the Clinical Center as a line item in the annual Office of the Director budget. As a result, the Clinical Center will continue to be funded through the NIH Management Fund. This was one of several SMRB recommendations for the Clinical Center, and others have already been implemented (e.g., promoting clinical research collaborations between intramural and extramural investigators, forming the Clinical Center Governing Board to provide strategic and operational oversight and make budget recommendations).

Long-Range NIH Research Contributions to Improvements in Health Care and Public Health: Selected Examples

NIH has supported biomedical research to enhance health, lengthen life, and reduce illness and disability for more than 100 years. Between 1970 and 2010, the life expectancy of the average American increased by 7.9 years.¹ Older Americans are not just living longer; they are staying healthy and active longer. Rates of reported risk factors for chronic disease (uncontrolled LDL or high blood pressure, smoking, etc.) have dropped by more than 10 percent since 1999. At age

¹ *Calculated from Health, United States, 2011: with Special Feature on Socioeconomic Status and Health*, <http://www.cdc.gov/nchs/data/hus/hus11.pdf>

65, Americans today can expect to live 19.2 more years – 40 percent longer than in 1950, and the vast majority of these adults continue to live without any activity limitations, a major improvement in just the past 30 years.² The largest growing demographic group in the United States consists of individuals living beyond the age of 85. We can attribute these remarkable improvements, in large part, to NIH research. NIH-funded projects have made many contributions that have advanced health care and enhanced public health. The following are some selected examples.

Heart Disease

Through research advances supported in large part by NIH, deaths from heart disease have fallen by more than 60 percent since 1970.³ The identification of cardiac risk factors such as smoking, high blood pressure, and high cholesterol by the Framingham Heart Study along with NIH-supported clinical trials led to the development of effective pharmacological and behavioral interventions, as well as safe and effective surgical and catheter-based procedures to open clogged coronary arteries.

Diabetes

Adults diagnosed with diabetes during middle age used to live on average 10 years less than adults without diabetes. Thanks to the development of early screening methods and treatments that enable better control of diabetes-related complications, adults with diabetes are living longer and healthier lives. Between 1997 and 2006, the death rate among adults with diabetes declined by 23 percent for all causes of death and by an extraordinary 40 percent for cardiovascular disease.⁴ These remarkable improvements are due largely to clinical trials supported by NIH. NIH research is also generating important insights into the prevention of diabetes. Studies funded through the Diabetes Prevention Program have shown that lifestyle changes, such as diet and physical activity, can lower the risk of developing type 2 diabetes by 58 percent in adults at high risk for diabetes.

Stroke

Fewer people are dying of stroke today—the age-adjusted stroke mortality rate has decreased by 70 percent since 1950 and by 33 percent since 1996. In 1995, an NIH-funded clinical trial established the first and only FDA-approved treatment for acute ischemic stroke. The drug tPA reduces the risk of disability and maximizes the potential for patient recovery. A recent analysis estimated that tPA can provide considerable cost savings—nearly \$74 million annually for the first post-stroke year alone—if used in just 20 percent of all ischemic stroke patients in the US. However, tPA must be administered within three hours of the onset of symptoms; current research at NIH is working to improve public awareness of stroke and to educate high risk populations on the importance of seeking immediate medical attention.

² Calculated from *Health, United States, 2010: with Special Feature on Death and Dying* <http://www.cdc.gov/nchs/data/hus/hus10.pdf> and *National Vital Statistics Reports Deaths: Preliminary Data for 2011 Vol. 61, Number 6* http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf.

³ Calculated from *Health, United States, 2011: with Special Feature on Socioeconomic Status and Health*, <http://www.cdc.gov/nchs/data/hs/hs11.pdf>

⁴ Gregg, E.W. et al. *Diabetes Care* 35, 1252–1257 (2012). *CDC News*: http://www.cdc.gov/diabetes/news/docs/cvd_2012.htm

Lung Cancer

Lung cancer is the second most common cancer and is the primary cause of cancer-related death in both men and women in the United States. NIH-funded research has contributed to a decrease in mortality, lowering the death rate per 100,000 people from 59.3 in 1990 to 47.6 in 2010, a 20 percent decrease. The recent development of targeted therapies, such as erlotinib and crizotinib, has led to dramatic responses in individuals whose lung cancers harbor particular genetic mutations. Recent data from an NIH-sponsored trial indicates that low-dose helical CT scans of heavy smokers can be effective in making the diagnosis of lung cancer early enough to achieve a surgical cure.

HIV/AIDS

Each year, 50,000 people in the United States become infected with HIV, the virus that causes AIDS. Currently, there are an estimated 1.1 million people in the United States and 34 million people globally who are living with HIV infection. In 2011 alone, 1.7 million people died from AIDS-related causes. In the early 1980s when the HIV/AIDS epidemic began, people with AIDS were not likely to live longer than a few years, but now, thanks in part to research funded by NIH, there are powerful treatments that can suppress the virus to undetectable levels, allowing those infected with it to live for many years and as a result, death rates have dropped by more than 13 percent. These treatments are also now being used to prevent the transmission of HIV from mothers to children and between sex partners, providing hope that the HIV/AIDS epidemic will one day be over.

Breast Cancer

Primarily because of NIH-supported research, multiple breast cancer susceptibility genes have now been identified, including BRCA1, BRCA2, TP53, and PTEN/MMAC1. Genetic testing now allows for tailored, safer, and more efficient treatments. As a result of these and many other advances, the death rate from breast cancer per 100,000 women declined from, 33.3 to 22.1 between 1990 and 2010.

Prostate Cancer

NIH-supported research on the treatment of prostate cancer has improved surgical approaches as well as radio-, chemo-, and hormonal therapies. The success of these advances has contributed to the significant decline in the death rate. Between 1990 and 2010, prostate cancer deaths per 100,000 men dropped from 38.4 to 21.9.

Cervical Cancer

Cervical cancer is a deadly cancer in women. It is usually a slow-growing cancer that may or may not have symptoms, but it can be detected during routine gynecologic examinations. Cervical cancer is almost always caused by human papillomavirus, or HPV, infection. Due to groundbreaking NIH research, two FDA-approved vaccines (Cervarix and Gardasil) are now available to prevent infection by HPV types 16 and 18, which cause about 70 percent of cervical cancer. Efforts have been underway to scale up the use of the vaccines both in the United States and abroad.

Infant Health

In 1960, 26 of every 1,000 babies born in the United States died before their first birthday. By 2010, the infant mortality rate was 6.1 per 1,000 births, considerably less than a generation before. A sustained, long-term effort, informed in large part by NIH research, contributed to these substantial improvements in the survival rates of infants born preterm and to advances in care for all newborns.

Adolescent Risk Behavior

In the last three decades, biological, epidemiological, and social science discoveries funded by NIH have produced a detailed understanding of the risks and mechanisms that lead to drug abuse and addiction in adolescents. This knowledge in turn has informed several new science-based prevention approaches. Today, the rate of cigarette smoking by teenagers is at its lowest point since the NIH-funded Monitoring the Future (MTF) survey began tracking drug use and attitudes of teens in 1975. Alcohol use by teenagers also has steadily declined since the 1970s, but increased slightly in 2012.

Age-Related Macular Degeneration (AMD)

A major cause of blindness and the leading cause of new cases of blindness in people over age 65, age-related macular degeneration (AMD), was largely untreatable prior to the 1990s. In 1991, an NIH-funded clinical trial established the value of laser treatment for advanced AMD to stabilize the condition. In 2001, NIH researchers announced that a daily dietary regimen of antioxidant vitamins and minerals delayed the onset of advanced AMD by 25 percent. In 2012, a clinical trial supported by NIH showed that long-term treatment of AMD with either the drug Avastin or the drug Lucentis resulted in dramatic and lasting improvement in vision, such that two-thirds of patients had driving vision (20/40 vision or better). More recently, researchers are beginning to understand epigenetic changes that can occur in individuals that result in an increased risk of AMD.

Hearing Loss

NIH-supported research has driven the development of hearing aids from the first electronic hearing devices invented in the 1950s to the sophisticated digital devices available today. Innovative collaborations between NIH, the Department of Veterans Affairs (VA), and the National Aeronautics and Space Administration (NASA) have significantly improved hearing aid technology over the past 20 years. In addition to amplifying sound, today's hearing aids are able to address the challenges of understanding speech, localizing sound, and hearing in noisy environments. Furthermore, many children born with congenital deafness can now be successfully treated with cochlear implants, giving them a lifetime of hearing.

Burns and Traumatic Injury

NIH funded research on fluid resuscitation, wound cleaning, skin replacement, infection control, and nutritional support has greatly improved the chances of surviving catastrophic burns and traumatic injuries. In the mid-1970s, burns that covered even 25 percent of the body were almost always fatal. Today, people with burns covering 90 percent of their bodies can survive, although often with some impairments. From 1990 to 2010, the death rate per 100,000 people from motor

vehicle traffic injury decreased from 18.5 to 11.3, and firearm fatalities dropped from 14.6 to 10.1. These dramatic increases in survival rates, as well as increased health, functioning, and quality of life of survivors, are in large part due to research findings that have transformed clinical practice.

Science Advances from NIH Research

Thousands of new findings are reported every year by NIH-funded scientists. Many of these findings are like pieces of a complex puzzle; taken together and over time, they provide the scientific basis for significant improvements in health. Listed below are just a few of the many recent accomplishments from NIH research:

[Detecting and treating autism early](#)

A recent [NIH-supported randomized clinical trial](#) demonstrated that an intensive early behavioral intervention delivered before the age of two years can improve symptoms as well as normalize brain activity in some children with autism. This finding adds to the growing evidence that detecting and treating autism early is key to improving outcomes.

[Treating autistic behaviors in a mouse](#)

NIH intramural researchers have reversed behaviors in mice resembling two of the three core symptoms of autism spectrum disorders (ASD). An experimental compound that targets the chemical messenger glutamate, called GRN-529, increased social interactions and lessened repetitive behaviors in a strain of mice that normally display such autism-like behaviors. Similar compounds are already being tested in patients with Fragile X syndrome – the most common form of inherited intellectual and developmental disabilities – about one third of whom also meet criteria for autism spectrum disorders. These findings suggest a strategy for developing a single treatment that could target multiple diagnostic symptoms in multiple, overlapping neurological disorders.

[Immune cells regulate brain development](#)

Scientists discovered a new role for immune cells called microglia in the developing brain. Microglia serve as a primary defense against infection and tissue damage in the brain. Researchers recently found that microglia engulf healthy precursor cells in the developing, prenatal brain– a surprising finding because the best documented function of microglia is to rapidly clear away dying cells. The reason microglia feast on neural precursor cells may be to regulate brain size during development, akin to putting the brakes on the rapidly developing brain. Since past studies have linked infections and immune activation during pregnancy with neurodevelopmental disorders, this finding may reveal insights into such disorders as autism and schizophrenia.

[How sleep clears the brain](#)

NIH-funded scientists discovered a system of tiny channels in the mouse brain which appear to quickly and efficiently remove waste products. Additional research showed that the brain flushes out more built-up toxins while the animal is asleep, giving new importance to getting adequate amounts of sleep to help with everyday functions. Before this discovery, it was widely

believed that nutrients and waste were transported through the slow process of diffusion. Innovative brain imaging techniques allowed the investigators to study the intact mouse brain in real time, revealing an efficient pressure-driven system of channels located in a special type of glial cell – called astrocytes – located at the base of the blood-brain barrier. Further, malfunction of this “glymphatic system” in mouse brain slowed the clearance of amyloid beta, a brain protein that builds up in patients with Alzheimer’s disease. The finding shows that the brain can cleanse itself in a more organized way and on a much larger scale than has been realized previously; it may lead to new strategies for treating neurodegenerative disorders.

[NIH-funded researchers create next-generation Alzheimer’s disease model](#)

A new genetically engineered lab rat that has the full array of brain changes associated with Alzheimer’s disease supports the idea that increases in a molecule called beta-amyloid in the brain causes the disease. Previously engineered animal models of Alzheimer’s disease never quite represented the full-blown disease, exhibiting only modest memory problems and some, but not all, of the pathological hallmarks of the disease. The findings support a prime research objective identified during the May 2012, NIH-supported Alzheimer’s Disease Research Summit 2012: Path to Treatment and Prevention, an international gathering of Alzheimer’s researchers and advocates. Improved animal models are key to advancing understanding of this complex disease and testing promising interventions.

[Killing cancer with radioactive bacteria](#)

For the first time, NIH-funded researchers employed live bacteria to deliver a lethal dose of radioactivity to pancreatic cancer cells in mice without harming normal cells, offering a potential new treatment avenue against a form of cancer that is notoriously difficult to treat. An estimated 45,000+ new cases of pancreatic cancer occur each year, resulting in more than 38,000 deaths from the disease. While cancer therapy is often effective against primary tumors, pancreatic cancers are typically not diagnosed until the cancer has spread or metastasized. Using a new approach, researchers attached a short-lived radioisotope to a type of bacterium that could easily be cleared by immune responses in normal tissues but not in the heavily immune-suppressed environment of cancer cells. After injecting the radio-tagged bacteria in cancer-prone mice, the number of metastases was reduced by 90 percent compared to control mice injected with saline. With further development, this experimental approach might one day help doctors fight this deadly type of cancer in people.

[Technique directs immune cells to target leukemia](#)

Cancer Immunotherapy was designated as the 2013 Breakthrough of the Year by *Science* magazine. Using a form of targeted immunotherapy, NIH-funded clinician-scientists were able to induce remission in five adults with an aggressive form of leukemia, and who had relapsed – a situation with typically poor prognosis. Targeted immunotherapy directs the patient’s own immune system to attack cancer cells. The researchers first remove immune cells known as T cells from the patient. These cells are genetically modified to produce an artificial receptor that can latch onto cancerous cells and trigger their destruction. The modified T cells are then infused back into the patient. The researchers found that all five of the patients who received the therapy were in complete remission within weeks of the T-cell infusion. The early results of this ongoing trial are extremely promising, and several more patients are now being tested.

Genomic analysis of endometrial tumors

A new study suggests that genomic classification of endometrial tumors could help guide treatment strategies. Cancer of the endometrium, the tissue that lines the uterus, is the fourth most common cancer among women in the United States. Experts predict that close to 50,000 women will be diagnosed with the disease in 2013, with more than 8,000 deaths. Investigators in The Cancer Genome Atlas (TCGA) Research Network undertook a comprehensive genomic analysis of nearly 400 endometrial tumors. Four novel genomic-based subtypes of endometrial cancer emerged from the analysis, knowledge that could help inform new diagnostic and treatment approaches. The researchers found that about 25 percent of tumors classified by pathologists as “high-grade endometrioid” have a pattern of genetic alterations much like that of serous tumors. Surprisingly, the researchers also found similarities between endometrioid and colorectal tumors. The parallels suggest that these tumors may benefit from a similar course of treatment.

Antibodies protect against range of flu viruses

Scientists have isolated antibodies that protect mice against a variety of lethal influenza B viruses. One of them also guards against influenza A viruses. The accomplishment points the way toward universal approaches to combat all influenza A and B viruses, as mentioned above. Type A viruses include the H5N1 avian virus, the 1918 pandemic flu virus and the seasonal H1N1 flu. Type A has several subtypes, but researchers recently isolated antibodies that neutralize a broad range of influenza A viruses. Influenza B viruses have received less attention than type A viruses. Type B viruses are not harbored by large numbers of animals, a requirement for creating pandemics. Nevertheless, a significant number of seasonal flu cases are caused by influenza B. To develop a universal flu vaccine or therapy, one needs to be able to provide protection against influenza A and influenza B viruses. The development of these broadly neutralizing antibodies against both virus types is a significant step toward a universal flu vaccine.

Clues in H7N9 influenza genetic sequences

Researchers quickly analyzed the novel avian influenza virus that has caused recent illness and death in China. Their effort gives clues to the virus’s origin, transmissibility and treatment. Influenza virus strains are classified and named based on the viral surface proteins hemagglutinin (HA) and neuraminidase (NA). The team studied the genetic sequences of viruses isolated from four of the earliest fatal cases. The researchers found that the novel H7N9 viruses are likely to be treatable using NA inhibitors, a class of anti-influenza drugs that includes oseltamivir (Tamiflu) and zanamivir (Relenza). However, the novel strain won’t likely be treatable with ion channel inhibitors, another major class of anti-influenza drugs. NIH researchers are conducting two clinical trials of an H7N9 vaccine, expected to conclude in December 2014, in order to be ready in the eventuality that the virus becomes readily transmissible between humans.

New bacteria stops malaria transfer between mosquitoes

NIH-funded scientists have found a way to infect mosquitoes with bacteria in order to break the genetic transmission of malaria, which kills approximately 660,000 people worldwide every year. Notably, the bacterial infection that would be introduced to mosquitoes is heritable and could be passed on for as many as 34 generations of the aerial blood-suckers, rendering them immune to malaria parasites. Researchers have also demonstrated that the infection killed

malaria parasites in the mosquitoes' digestive systems as well as salivary glands, the main point of transmission to humans through bites.

[Implanted defibrillators boost "real world" survival](#)

A new study linked implanted cardiac devices to improved survival rates, whether or not patients were participating in a carefully controlled clinical trial. Implantable cardioverter-defibrillators (ICDs) can save the lives of patients with heart failure. This small device is placed in the chest and monitors heartbeats and delivers electrical pulses if dangerous rhythms (arrhythmias) are detected. These pulses can normalize the heartbeat to prevent sudden cardiac arrest and death. Earlier clinical trials showed that ICDs can lengthen patient survival compared to optimal medical therapy. But it was unclear if the benefits seen in highly controlled clinical trials would hold true in real-world settings. In a recent study involving data from more than 5,000 patients, researchers found similar survival rates for real-world and clinical trial ICD participants. The researchers also found that matched ICD recipients in the real-world registry had significantly greater survival than trial participants who received only standard medical therapy.

[Stiffening of the blood vessels precedes the development of hypertension](#)

Analysis of data from the Framingham Heart Study has shown that stiffening of the blood vessels occurs before the development of hypertension (high blood pressure), a discovery that runs counter to the widely held belief that increased arterial stiffness is instead a consequence of hypertension. The finding sheds light on the mechanisms that cause hypertension and suggests new therapeutic approaches to prevent or delay its development.

[Rutin shows promise as blood thinner](#)

Researchers have shown for the first time that a substance called rutin is a promising candidate for development of a new drug to prevent blood clots. Scientists hoping to develop safer, more effective blood thinners recently identified rutin after screening nearly 5,000 molecules for their ability to block clot formation. Since it occurs naturally in many foods and is well tolerated by humans, researchers hope that it will prove useful for many patients without causing the harmful side effects that sometimes occur with currently available blood thinners.

[Stabilizing vaccines and antibiotics with silk](#)

NIH supported researchers have developed a way to use silk to store and distribute vaccines and antibiotics without having to keep them cold. By eliminating the need for refrigeration, the technique can lower costs and help expand the use of these lifesaving medical tools around the world. Currently, vaccines and antibiotics require extensive "cold chain" distribution networks to prevent the breakdown of these compounds when exposed to heat and humidity. This process is expensive and accounts for up to 80 percent of the cost of vaccines. Utilizing silk fibers to create a silk film that is inherently resistant to changes in moisture and temperature greatly enhances a vaccine's stability. For example, the researchers found that a measles, mumps and rubella (MMR) vaccine retained more than 80 percent of its potency after storage at 45 °C (113 °F) for six months. Typically, the MMR vaccine would rapidly lose all its potency under those conditions.

Platelet drug shows promise for treating severe, unresponsive aplastic anemia

An early-phase study at the NIH Clinical Center has shown that eltrombopag, a drug that was designed to stimulate production of platelets from the bone marrow and thereby improve blood clotting, can raise blood cell levels in some people with severe aplastic anemia who have failed to benefit from standard therapies. This encouraging study suggests that the drug can stimulate bone marrow stem cells and perhaps have wider utility than initially thought.

Lab-grown kidneys function in rats

End-stage kidney disease, or renal failure, affects nearly one million people nationwide. Renal failure can be reversed with kidney transplants from well-matched donors. But about one in five recipients has problems with organ rejection within five years, and there are not enough donated kidneys to meet demand. About 100,000 people in the U.S. are now on the waiting list for a kidney transplant. To provide new options for these patients, researchers have been exploring techniques for creating artificial kidneys and other organs. Just this year, NIH-funded scientists created artificial kidneys that can filter blood and produce urine when transplanted into rats. With further development, this approach could help the many patients who await organ transplants because their own kidneys no longer work.

Heart muscle cells derived from human embryonic stem cells may be useful in cardiac repair

Tissue engineering holds promise for regenerating damaged tissues and organs by stimulating them to heal themselves, but the approach to heart disease has been associated with worrisome complications such as arrhythmias. In a recent study, investigators transplanted heart cells grown from human embryonic cells into guinea pigs and showed that the cells electrically coupled and beat in sync with the animals' hearts. With further development, this approach may prove useful for heart attack survivors who are left with damaged heart muscle that can lead to progressive heart failure.

Stem cell research explains problems with blood cell formation in Down syndrome

People with Down syndrome—they have three copies of chromosome 21 instead of two—are born with abnormal blood counts and experience defects in blood formation throughout their lives. Researchers have now reported the successful use of induced pluripotent stem cells and embryonic stem cells to model the effects of the additional chromosome copy. They showed that when the additional chromosome is present, the formation of blood stem cells is disrupted. Not only do these results enable a better understanding of disease progression in people with Down syndrome, but the same approach can also be used to model other diseases.

Egg-producing stem cells found in women

Scientists long believed that women are born with a fixed number of young egg cells, or oocytes, which must last through their reproductive years. NIH-supported scientists were able to isolate egg-producing stem cells from the ovaries of women and observe these cells giving rise to oocytes. The finding may point the way toward improved treatments for female infertility.

Adult stem cells help regenerate injured lungs

NIH-funded researchers have reported that adult stem cells residing in the lung may enable lung structures to regenerate after catastrophic injury. A study in mice with induced lung damage found that a type of stem cell from the small airways proliferated rapidly, radiated to the injured regions, and assembled into structures resembling air sacs. These findings provide a critical new understanding that may aid in the development of cell-based therapies for chronic lung diseases that presently have no cure.

Researchers derive lung cells from embryonic stem cells

For the first time, scientists have established a procedure to direct embryonic stem cells to differentiate into lung cells—overcoming a major barrier to realizing the potential of regenerative medicine in the lung. Researchers were able to use the same differentiation strategy to produce disease-specific lung progenitor cells from induced pluripotent stem cells derived from patients with cystic fibrosis. This advance will improve scientists' ability to model lung diseases, test individual responses to treatments, and develop cell-based therapies for lung diseases.

Scientists find link between abnormal bone marrow cells and pulmonary arterial hypertension

Investigators have uncovered a new clue to the cause of pulmonary arterial hypertension, a progressive and frequently lethal disease that in many cases arises mysteriously. Findings from a recent study suggest that bone marrow-derived endothelial progenitor cells play a role in causing the vascular injury in the lung that underlies the disease.

Rare gene variants play a role in asthma susceptibility

A detailed exploration of selected DNA sequences has found rare variants of genes that influence asthma susceptibility in people of different backgrounds. Researchers determined that variants of four genes contributed to asthma susceptibility in African Americans, while a variant of one of the same genes was associated with asthma susceptibility in European Americans. The results may ultimately be useful in identifying people at risk for developing asthma.

Mobile technology approach can boost healthy eating and physical activity

A new study has suggested that a combination of mobile technology and remote coaching holds promise for encouraging healthier eating and physical activity behaviors in adults. The work focused on innovative approaches to changing multiple health behaviors.

Preclinical study shows heroin vaccine blocks relapse

NIH-funded scientists have reported successful preclinical tests of a new vaccine against heroin. The vaccine targets heroin and its psychoactive breakdown products in the bloodstream, preventing them from reaching the brain. According to the researchers, “Heroin-addicted rats deprived of the drug will normally resume using it compulsively if they regain access, but our vaccine stops this from happening.” If the vaccine works as well in human trials, it could become a standard part of therapy for heroin addiction, which is estimated to affect more than 10 million people worldwide.

Hormone may help treat diabetes

A newly discovered hormone called betatrophin prompts cells in the pancreas to multiply and produce more insulin. The finding, in mice, may lead to new ways to prevent or slow the progression of diabetes. NIH-funded researchers set out to try to identify a signal that seems to be sent by the liver to the beta cells when the insulin receptor is blocked and blood glucose levels rise. The researchers found that after the insulin receptor was blocked, one particular liver gene increased its activity significantly. They were able to show that this gene, which turned out to be one of the 20,000 genes that has not attracted much attention so far, coded for a secreted protein. Because it helps beta cells grow, they named it “betatrophin.” Researchers are now looking at how this hormone may be used in humans.

Gastric bypass surgery reduces blood glucose levels and helps control type 2 diabetes

A recent study has shown that bariatric surgery can help control type 2 diabetes more effectively than medical therapy alone, and can help reduce the need for medications to lower glucose, lipids, and blood pressure. Studying patients with obesity and poorly controlled type 2 diabetes, researchers compared patient outcomes achieved through intensive medical therapy (which included lifestyle counseling, weight management programs, frequent home glucose monitoring, and the use of diabetes medications) to those obtained with intensive medical therapy in combination with bariatric surgery. After 12 months, blood glucose was reduced to levels below the diabetic range in only 12 percent of participants who received medical therapy alone, compared to upwards of 40 percent of those who also received gastric bypass. Longer studies will be needed to determine whether the metabolic improvements observed in the surgery patients will be durable and will translate to diverse racial/ethnic groups; meanwhile this finding adds to existing evidence that bariatric surgery may be a reasonable approach for treating some patients with obesity and uncontrolled type 2 diabetes.

Gut microbes affect weight after gastric bypass

Gastric bypass is a type of surgery used to treat severe obesity. In a procedure known as Roux-en-Y gastric bypass (RYGB), parts of the stomach and small intestine are removed. The procedure results in significant weight loss as well as improvements in associated conditions such as type 2 diabetes. NIH-funded researchers recently showed that the beneficial effects of RYGB surgery are due in part to changes in the gut microbial community. They collected samples of gut microbial communities from mice that had undergone gastric bypass, sham surgery, or sham surgery plus restricted diet. The samples were put into the stomachs of lean mice that were germ free and thus had no preexisting gut microbial communities. The mice that received microbes from the RYGB surgery mice lost weight and had less fat mass than mice that received microbes from either group of sham surgery mice.

Brain Patterns May Help Predict Relapse Risk for Alcoholism

Relapse to heavy drinking is a major obstacle to recovery for many alcohol dependent individuals, often triggered by stress or drinking-related cues that can induce craving for alcohol. Using brain imaging techniques, investigators found that individuals in recovery and who showed heightened activity in the prefrontal region of the brain were more likely to experience cravings for alcohol and subsequent relapse. The findings suggest that brain activity patterns

may be useful in the future to identify individuals at greatest risk for relapse, and that medications and/or behavioral interventions that target the prefrontal region of the brain may be beneficial for patients with the highest relapse risk.

Mobility for Paralyzed Patients

A promising new therapy for patients who are paralyzed after a spinal cord injury has been developed through the NIH's Rehabilitation Engineering program. Researchers developed a 16-electrode array to stimulate the membrane that surrounds the spinal cord (called epidural stimulation). The device, about the size of a french fry, is implanted in the patient's lower back near the spinal cord and sends a low-level electrical stimulation to the spinal cord, similar to a pacemaker for the heart. To date, all three of the patients who have tried the device are able to stand and voluntarily control both legs when stimulation is applied. The investigators are planning additional human and animal studies to explore the biological mechanism for recovery of voluntary movement.

3D model of opioid receptor reveals potential drug target for non-addictive pain medication

Abuse of opioids—including heroin, morphine and certain prescription painkillers—is a major public health problem. NIH researchers are seeking to develop pain medications with diminished abuse potential, which could reduce the need for highly addictive opioid medications. In a step closer to this goal, NIH-funded scientists have produced the first high-resolution, three-dimensional image of the kappa subtype of opioid receptor (KOR) – the one opioid receptor subtype known to mediate pain relief without the rewarding effects of other opiates. The 3D map reveals how the receptor binds to a molecule that occurs naturally in the brain, providing a long anticipated molecular framework for designing pain medications with less or no abuse potential.

First step-by-step snapshots of transcription initiation

When a gene is turned on—such as insulin in pancreatic cells or melanin in skin cells—an enzyme called RNA polymerase transcribes the genetic information from DNA into RNA. Errors in transcription can lead to malfunctions that may turn cells cancerous or trigger a host of other health problems. NIH-funded researchers have achieved a major advance in understanding transcription by providing the first step-by-step look at the molecular machinery that initiates the process. By re-enacting the process in a test tube and using an imaging technique called cryo-electron microscopy, they captured snapshots showing that a bevy of helper molecules bind to the DNA and assemble into a growing complex in a precise, stepwise manner. This complex provides a landing pad for the polymerase and primes the DNA for transcription. Knowing how this intricate complex forms provides a valuable framework for understanding a fundamental cellular process with important medical implications.

Proteins in the cornea yield clues to potential new class of antibiotics

The cornea, the outer protective layer of the eye, is amazingly resilient to infection. A team of NIH-supported investigators have identified small fragments of keratin proteins in the cornea that are responsible for fighting infections and pathogens. Synthetic variations of these peptides effectively killed bacteria that lead to flesh-eating disease, strep throat, staph infections, diarrhea, and cystic fibrosis-associated lung infections. These findings could lead to a powerful new class of low-cost, non-toxic antibiotics at a time when antibiotic resistance is of growing concern.

Novel screening strategy identifies new class of antibiotics

Antibiotic resistance is a growing problem in the U.S. and around the world, and the number of new antibiotics reaching the clinic continues to decline. Recently, though, NIH-funded researchers have developed an innovative and cost-effective screening approach, called BioMAP, to identify potential new antibiotics, including some with the ability to kill drug-resistant bacteria. The BioMAP process successfully predicted known antibiotics and resulted in the identification of a new structurally unique antibiotic (named arromycin). BioMAP is a ground-breaking tool that can be used in academic as well as industrial laboratories to facilitate new natural products antibiotic discovery and address the looming antibiotic crisis.

DNA blood test for newborns may lead to early treatment for spinal muscular atrophy

Spinal muscular atrophy (SMA) is a genetic disease that attacks nerve cells, called motor neurons, in the spinal cord. SMA weakens muscles and can affect walking, crawling, breathing, swallowing, as well as head and neck control. Early treatment is critical; however, the short window of opportunity often occurs before symptoms appear. To address this challenge, researchers have developed an inexpensive and quick DNA test that could be used shortly after birth to identify newborns at risk of developing spinal muscular atrophy (SMA). The highly sensitive new test works by screening blood samples for the unique SMN1 gene mutation. If the test results are positive, a follow-up test can be done to detect an associated gene, known as SMN2, which could indicate the severity of disease. This new DNA screening test may help clinicians to diagnose SMA more quickly and start crucial treatment as early as possible.

New models improve the prediction of seasonal flu epidemics

Human influenza infections exhibit a strong seasonal cycle in temperate countries, such as the U.S. NIH-funded scientists assessed the role of humidity and other local climatic variables on influenza seasonality by modeling public health and climatic data from around the world. They concluded that there are two types of environmental conditions associated with seasonal influenza epidemics: “cold dry” conditions and “humid-rainy” conditions. The models developed through this research enable scientists and public health experts to 1) predict peak flu seasons given climate variables; and 2) identify the climate thresholds that explain different flu seasonality patterns around the world. The development of these new models enhances existing influenza transmission models and provides more accurate predictions of the timing of influenza activity worldwide.

Drug restores hearing in noise-deafened mice

Our ability to hear relies on sensory hair cells in the inner ear. When hair cells are damaged — by disease, injury, or aging — people experience hearing loss and cannot regenerate hair cells on their own. NIH-funded scientists have shown for the first time that a drug can be used to grow sensory hair cells in the inner ear of mice. The drug blocks a protein that normally prevents stem cells in the inner ear from turning into hair cells. When the drug was injected into the inner ear area containing hair cells in noise-deafened mice, the drug encouraged cells supporting and surrounding the hair cells to turn into new hair cells leading to small improvements in the mice’s hearing. This is the first study to show that scientists can use a drug to partially restore hearing in a mouse with noise-induced hearing loss.

Spontaneous gene mutations implicated in congenital heart disease

Findings from NIH's Pediatric Cardiac Genomics Consortium – an international multi-center collaborative research effort – have brought us closer to understanding the causes of congenital heart disease, the most common type of birth defect. The unprecedented large-scale genetic analysis found that spontaneous gene mutations affect a specific biological pathway that is critical to aspects of human development, including the brain and heart. An analysis using state-of-the-art sequencing and genome mapping techniques revealed that children with congenital heart disease had a greatly increased rate of spontaneous mutations among genes that are highly expressed, or active, in the developing heart. The findings will inform future research into the causes of congenital heart disease with the ultimate goals of improving treatment and eventually uncovering ways to prevent congenital heart disease in the early stages of heart formation.

Rapid test allows for earlier diagnosis of tuberculosis in children

Preliminary diagnosis of tuberculosis (TB) is currently made by examining respiratory secretions under a microscope and sending the sample to a laboratory to be cultured and identified. The results of the culture test can take more than two weeks to confirm a diagnosis. Diagnosing TB in children is further complicated because children tend to have much lower levels of the TB bacteria than adults. A new test, developed with NIH support, detects TB in children within an average of 24 hours. The availability of this rapid, accurate test in primary care settings can enable children to receive appropriate treatment quickly, decreasing the likelihood of hospitalization or other complications.

A step closer to a vaccine for malaria

A malaria vaccine being tested in an NIH-funded clinical trial was found to be safe, to generate an immune system response, and to offer protection against malaria infection in healthy adults. One of the most severe public health problems worldwide, malaria is transmitted to humans by the bite of an infected mosquito. After the bite occurs, infectious malaria parasites in the immature, sporozoite stage of their life cycle first travel to the liver, where they multiply, and then spread through the bloodstream, at which time symptoms develop. The vaccine trial found that participants who received the higher total dose of the experimental vaccine were able to generate a stronger immune response and, when exposed to mosquitoes carrying malaria, fight off infection.

Pharmacoperones and new treatments

Proteins throughout the body have specific structures that allow them to interact with each other and other molecules so that all of the body's systems can function properly. However, in many diseases, including cystic fibrosis, inherited cataracts, Parkinson's, Huntington's, and Alzheimer's, gene mutations cause proteins to misfold, changing from orderly sheets and spirals to tangled strands. While medical treatments may address the symptoms of these diseases, they cannot correct the underlying misfolded proteins. NIH-supported researchers discovered a new way for small molecules called pharmacoperones to enter cells and fix the misfolded proteins, restoring the proteins' normal functions. In mouse studies, researchers used this technique to cure a disease (also occurring in humans) that causes males to be unable to father offspring. This new approach using pharmacoperones could affect treatment development for a wide range of diseases.

Liquid-to-gel injection aids formation of new bone

NIH-funded researchers have engineered a material that can aid the regeneration of bone tissue in irregularly-shaped craniofacial bones. The material begins as liquid at room temperature and is injected into the body at an injured site, where it turns into gel upon reaching body temperature. Once the gel is in place, researchers said, “It enables the formation of scaffolds locally and the delivery of growth factors and stem cells into defects of complex anatomical shapes with minimal surgical intervention.” After bone tissue has been successfully regenerated, the gel can be changed back to liquid and released from the site.

Genetic microsurgery

A new technology called CRISPR (clustered regularly interspaced short palindromic repeats) is allowing scientists to specifically target genes for deletion, addition, activation, or suppression in what amounts to performing their own genetic microsurgery. The method harnesses a protein that is involved in a bacteria’s adaptive immune response that works through precise targeting of DNA. Using this system, NIH-supported researchers have altered DNA in human cells, rats, mice, zebrafish, bacteria, fruit flies, yeast, nematodes, and crops. This wide-ranging applicability makes the technology potentially valuable for numerous applications, including treatment of genetic diseases.

Protein surface yields key ingredient for vaccine design

NIH-funded researchers used structural biology—the study of the architecture of the molecules of life—to design key parts of vaccines to protect against respiratory syncytial virus (RSV), which affects millions of infants each year, as well as HIV. When researchers found an antibody that attached tightly to the RSV’s surface, they used x-ray diffraction techniques to determine the precise location of binding. They used this information to design an RSV protein to serve as an immunogen, the main component of a vaccine. Injecting this protein into animal models generated an immune response, making it a good candidate for vaccine development to prevent RSV. Similarly, another group of researchers identified important features on a surface protein of HIV and then designed a novel version of the surface protein to try to generate an immune response that would fight the infection. While more testing is warranted in both cases, this promising strategy could prove worthwhile in developing vaccines against life-threatening illnesses.

**National Institutes of Health
FY 2015 Congressional Justification**

Funding History ¹

2011 ²	\$30,935,000,000
2012 ³	\$30,852,187,000
2013 ⁴	\$29,143,262,321
2014	\$30,142,653,000
2015 PB	\$30,353,543,000

¹ Annual amount includes discretionary budget authority received from both Labor/HHS appropriations that fund ICs as well as the Interior, Environment & Related Agencies appropriation that supports NIH Superfund Research activities. Also includes mandatory budget authority derived from the Special type 1 Diabetes account. Excludes the PHS Evaluation Fund allocation to NLM.

² Includes \$998,000 from HHS for General Departmental Management transfer for the Interagency Autism Coordinating Committee.

³ Includes Secretary's transfer.

⁴ Includes effect of sequestration and Secretary's transfer.

Summary of the Request: Narrative ⁵

For FY 2015, the NIH requests a program level of \$30.362 billion, a \$211 million or 0.7 percent increase above the FY 2014 program level of \$30.151 billion. Within the FY 2015 requested level, NIH will invest in areas of the most extraordinary promise for biomedical research and enhance the scientific workforce, working to recruit and retain the best and brightest from all of our nation's diverse populations to tackle major health challenges facing the Nation now and in the future. This request preserves NIH's highest priority activities. The following summary discusses estimates of budget mechanism amounts, which change throughout the course of the year due to scientific opportunities and the results of peer review. Mechanism and sub-mechanism levels are not proposed programs, projects, and activities.

Research Project Grants: Research project grants (RPGs) are the primary mechanism for funding of investigator-initiated biomedical research. These grants support new and experienced investigators in broad-based research programs. The use of RPGs as a mechanism of support covers the entire medical research continuum, from basic scientific research at the molecular and cellular levels to studies of human beings in both healthy and diseased states. Most grant applications originate with individual investigators who develop proposals for research in their area of interest. Research project grants awarded to institutions on behalf of a principal investigator support medical research activities in the areas of both the specific interests and competence of the principal investigators and in areas identified as high priority by the NIH Institutes and Centers (ICs).

NIH uses several RPG activities to support the best research applications from the most talented researchers. The most common, the traditional R01 grant, supports a single project with a principal investigator or co-investigators. Another frequently used grant is the P01, a multi-project grant, which supports a variety of broad-based multi-disciplinary projects conducted by numerous investigators working on various aspects of a specific major research objective or theme.

Budget Policy:

The FY 2015 President's Budget estimate for this high priority mechanism is \$16.197 billion, or a 0.7 percent increase over the FY 2014 Enacted level. This level of support enables NIH to nominally increase the pace and scope of ongoing research, as well as stimulate participation of new researchers and the accompanying development of fresh ideas. To maximize the number of new and competing grants, in FY 2012 inflationary increases for future year commitments were discontinued for all competing and non-competing awards, however adjustments for special needs (such as equipment and added personnel) will continue to be accommodated. The average cost of new and competing RPGs is estimated to decrease by 6.6 percent compared to FY 2014. This is due to a cohort of very large grants that are expected to be awarded in FY 2014 and will become non-competing in FY 2015. The request is estimated to fund a total of 34,197 RPGs, essentially to the same as the number of grants anticipated in FY 2014. Of total funding, \$4.132 billion would support an estimated 9,326 new and competing RPGs, an increase of 329 over the 8,997 new and competing RPGs estimated for FY 2014. The amount allocated for these grants

⁵ All referenced amounts reflect adjustments for comparability to FY 2015 for the proposed direct funding of the National Center for Biotechnology Information / Public Access in the National Library of Medicine.

would decrease by \$133.9 million, or about 3.1 percent, while the amount allocated for non-competing RPGs would increase by \$239.0 million, or about 2.2 percent. Administrative Supplements would receive approximately \$149.2 million in FY 2015, a decrease of \$5.1 million compared to the \$154.3 budgeted for FY 2014. NIH will also enhance its strong commitment to extramural grants targeted to small business innovative and technology transfer research (SBIR/STTR) programs. SBIR/STTR grants would receive \$716.6 million to support an estimated 1,635 awards, a \$19.5 million increase, or 2.8 percent, compared to the \$697.1 supported in FY 2014 – meeting the increased minimum set-aside thresholds for FY 2015 established under the SBIR/STTR Reauthorization Act of 2011.

Research Centers: Research center grants are awarded to institutions on behalf of a program director and a group of collaborating investigators to: (a) provide long-term support for leading-edge research; (b) conduct multi-disciplinary programs of biomedical research; and (c) develop research resources. The Research Centers program aims to integrate basic research with applied research and transfer activities; to promote research in the areas of clinical applications with an emphasis on intervention, including prototype development and refinement of products, techniques, processes, methods, and practices; to develop and maintain the biotechnology and research model resources needed by NIH-supported biomedical investigators for conducting research; and, to assist minority institutions in improving their research infrastructure.

Budget Policy:

NIH estimates a slight increase of support for Research Centers in FY 2015; at \$2.723 billion this represents a \$9.8 million increase, or 0.4 percent, compared to the FY 2014 Enacted level. This level would fund an estimated 1,370 awards, or 23 more grants than the 1,347 projected for FY 2014.

Other Research: NIH continues to support a variety of investigator-initiated activities through other types of research grants. Through the Research Careers program, NIH provides increased career opportunities in medical research to scientists of superior potential. The program provides support for young investigators who desire advanced development and scientists who need experience to qualify for senior positions. Other Research mechanisms include support for research initiatives in the cooperative clinical research sub-mechanism to encourage regionally-based clinical evaluations of methods of therapy and prevention strategies. Minority Biomedical Research Support Grants fund research that enriches the biomedical research environment at undergraduate institutions. Moreover, these grants strengthen the research training capabilities of minority faculty and students. Other Research grants also support grants for: shared resources for grantee institutions; purchase of equipment; implementation of the Nanotechnology program of the Common Fund; and conference grants to support investigator-initiated meetings, conferences or workshops to promote sharing of scientific knowledge and address specific issues.

Budget Policy:

The \$1.868 billion estimated for this mechanism reflects an increase of \$43.2 million, or 2.4 percent, relative to the FY 2014 Enacted level. That amount would fund a total of 6,506 grants, an increase of 24 awards or 0.4 percent over the FY 2014 level.

Research Training: The purpose of the Ruth L. Kirschstein National Research Service Awards (NRSA) program is to strengthen the Nation's corps of biomedical and behavioral research investigators. Through institutional awards and individual fellowships, NIH supports both basic and applied research training in the biomedical and behavioral sciences. Institutional awards provide the foundation for the manpower development effort by supporting the national capacity for excellent, up-to-date training in a variety of institutional settings. They enable NIH to aid institutions in maintaining vigorous and effective research training programs and, in particular, to support research training programs in areas of national need. Funds are awarded for predoctoral and postdoctoral stipends and for tuition where warranted, with a modest allocation to the institution to defray training-related expenses not covered by tuition. NRSA's also include funds for travel, fees, indirect costs, and other expenses. Stipend levels constitute the largest portion of NRSA funding.

Budget Policy:

NIH proposes an average stipend increase of 2.0 percent above the FY 2014 level for trainees. This increase is consistent with stipend modifications recommended previously by the Advisory Committee to the NIH Director. More robust stipends were also embodied in recommendations included in a major training research study issued in 2011 by the National Research Council of the National Academy of Sciences.⁶ In addition, this increase is consistent with 42 USC 288(b)(5), which anticipates periodic adjustments in stipends "to reflect increases in the cost of living." Stipend rate adjustments continue a long-term strategy that NIH has used to more closely align stipend levels to salaries that could be earned in related occupations. The proposed stipend increase is intended to improve NIH's ability to attract high-quality research investigators to the field of biomedical research. In order to achieve NIH's research objectives, it is essential to ensure that highly trained scientists will be available to address the Nation's biomedical, behavioral and clinical research needs. NIH estimates \$767 million for this mechanism in FY 2015, a \$14 million, or 1.9 percent, increase above the FY 2014 Enacted level. That amount would support an estimated 15,715 total Full-Time Training Positions (FTTPs), 108 more than the 15,607 total FTTP funded by the FY 2014 Enacted level.

Research and Development (R&D) Contracts: NIH awards R&D contracts to acquire specific products, services or studies from academic institutions and nonprofit and commercial organizations. This mechanism also includes collaborative research efforts with other agencies, small business innovation research and architect-engineering services contracts.

Budget Policy:

FY 2015 funding for R&D contracts would increase by \$40.4 million to \$3.031 billion, an increase of approximately 1.4 percent above the FY 2014 Enacted level of \$2.990 billion. The estimated amount would fund 2,186 contract awards, essentially the same as the number of awards anticipated in FY 2014.

⁶ *National Research Council, Research Training in the Biomedical, Behavioral, and Clinical Research Sciences*, (Washington, DC, The National Academies Press, 2011)
(http://grants.nih.gov/training/Research_Training_Biomedical.pdf)

Intramural Research: Through the Intramural Research Program (IRP), NIH conducts basic and clinical research at its on-campus research facilities in Bethesda, Maryland, and at off-campus locations such as the Gerontology Research Center in Baltimore, Maryland; Research Triangle Park, North Carolina; the Rocky Mountain Laboratories in Hamilton, Montana and Phoenix, Arizona. Fundamental research performed by intramural scientists provides the basis upon which advances in medical and dental care are built. An important byproduct of this research productivity is the cadre of young physicians and basic scientists who are trained in the techniques and approaches of intramural scientists. Many of these young researchers become extramural and intramural investigators. A valuable and unique feature of the NIH IRP is the Clinical Research Center, a 240-bed research hospital on the NIH campus. This world-class national resource promotes translational research -- that is, the transference of scientific laboratory research into applications that benefit patient health and medical care. The "bench-to-bedside" approach adopted in 1953 locates patient care units in close proximity to cutting-edge laboratories conducting related research, which facilitates interaction and collaboration among clinicians and researchers. Most importantly, patients and their families at the Clinical Center benefit from the signature elements of NIH (i.e. cutting-edge technologies, research programs, and compassionate care).

The IRP supports vital research being conducted at NIH by some of this Nation's top scientists. This powerful network of investigators is an integral part of the greater national research network devoted to advancing the knowledge needed to develop treatments, tests, and prevention strategies to benefit the public as quickly as possible. A strong intramural program at NIH complements and reinforces the work being carried out in the extramural biomedical research community.

Budget Policy:

This mechanism is estimated at \$3.435 billion, a \$39.4 million, or 1.2 percent, increase above the FY 2014 Enacted level. This level covers a projected 1.0 percent increase for full-time equivalent (FTE) payroll attributable to annualization of the January 2014 pay raise of 1.0 percent and the proposed January 2015 pay raise of 1.0 percent for civilian employees. Higher benefit costs linked to OPM mandated increases in the FERS agency contribution rate beginning in FY 2015 as well as projected growth in health insurance premium payments are also accommodated.

Research Management and Support (RMS): This mechanism supports many functions, including: scientific direction and management by NIH staff in the review, award, and performance monitoring of extramural awards (research grants, training awards, and research and development contracts); administrative and technical support for Congressionally-mandated review groups and advisory councils; liaison among NIH and Departmental components, as well as among applicants, grantees, advisory bodies, and special interest organizations; and monitoring of advances emerging from basic science laboratories to determine possible clinical applications for treatment and prevention. Management and administrative functions for each IC are also supported by this mechanism. Examples of such functions include: interpreting, analyzing, and implementing new legislation and administrative orders; formulating and executing IC budgets; performing management evaluation studies; determining manpower requirements; assessing the condition of both NIH and extramural grantee laboratory facilities and equipment; supporting prevention and education activities, including development of

educational and informational materials for both the medical community and the general public; and providing the leadership and business functions for the ICs.

Budget Policy:

RMS is estimated at \$1.544 billion, an increase of \$15.4 million or 1.0 percent above the FY 2014 Enacted level. This level covers a projected 1.0 percent increase for full-time equivalent (FTE) payroll attributable to annualization of the January 2014 pay raise of 1.0 percent and the proposed January 2015 pay raise of 1.0 percent for civilian employees. Higher benefit costs linked to OPM mandated increases in the FERS agency contribution rate beginning in FY 2015 as well as projected growth in health insurance premium payments are also accommodated.

Office of the Director: The Office of the Director (OD) provides leadership, coordination, and guidance in the formulation of policy and procedures related to biomedical research and research training programs. To provide this direction, the OD centrally coordinates NIH's extramural and intramural research activities; science policy and related social, ethical, and legal issues; technology transfer and intellectual property protection policies; health information dissemination and public education functions; legislative activities; and, oversight of the agency's stewardship of public funds.

OD encourages and fosters cross-Institute NIH research and research training efforts in the prevention and treatment of disease through program coordination offices that complement the efforts of the ICs. These offices focus on Acquired Immune Deficiency Syndrome (AIDS); women's health; disease prevention; science education; dietary supplements; rare diseases and disorders; and behavioral and social sciences research. While OD provides the overall direction, coordination and oversight of these programs, the ICs manage the actual research operations.

The OD request also includes the NIH Common Fund that supports cross-cutting, trans-NIH programs that require participation by at least two NIH ICs. The requirements for the Common Fund encourage collaboration across the ICs, while providing NIH with flexibility to determine priorities for Common Fund support.

Budget Policy:

The FY 2015 request of \$1.452 billion reflects an increase of \$52.0 million, or 3.7 percent, compared to the FY 2014 Enacted level. The Office of Research Infrastructure Programs and the Science Education Partnership Program would receive \$294.2 million – the same level as planned for FY 2014. The OD Common Fund would receive \$50.0 million above the FY 2014 level, a 9.4 percent increase that includes \$30.0 million for a new DARPA-like program to achieve rapid technology development. A total of \$165.0 million would be provided for the National Children's Study, which is the same amount appropriated for FY 2014.

Buildings and Facilities: The buildings and facilities (B&F) program is responsible for the design, construction, improvement, and major repair of clinical and laboratory buildings and supporting facilities essential to NIH's research mission. This account has two major elements: the design and construction of new facilities for NIH research programs and the continuing repair and improvement of existing facilities.

Budget Policy:

This request would provide \$128.7 million for B&F, the same as the FY 2014 Enacted level. In addition to this is the \$8.0 million budgeted in the National Cancer Institute for facilities repairs and improvements (R&I) at the National Cancer Institute—Frederick Federally Funded Research and Development Center in Frederick, Maryland. The amount identified in FY 2015 for R&I projects at the NCI Frederick facility is the same as the FY 2014 level. The requested amount for B&F projects allows NIH to continue to support the Administration’s commitment to reducing water use and greenhouse gas emissions, improving building energy efficiency, and substituting renewable resources for fossil fuels in transportation assets.

Explanation - Other Activities

Type 1 Diabetes: A special program for research on Type 1 Diabetes was established by law in 1998 and is supported through a mandatory appropriation.

Budget Policy:

This program’s current authorization expires at the end of FY 2014 and reauthorization is proposed at \$150 million a year for three years. The FY 2015 request of \$150 million for these activities represents an increase of \$10.8 million, or 7.8 percent, compared to the FY 2014 post-sequester level of \$139.2 million.

Superfund: NIH’s contribution to the Superfund Program is to improve human health by addressing and preventing diseases and injuries associated with environmental contaminants. The Superfund Research Program (SRP) and the Worker Training Program (WTP) complement each other to create effective community and workplace public health interventions aimed at preventing harmful exposures.

Budget Policy: The FY 2015 request of \$77.4 million is the same as the FY 2014 Enacted level.

NCBI/Public Access: The FY 2013 and FY 2014 levels in the request reflect comparable adjustments in the Institutes and Centers to centralize support for the National Center for Biotechnology Information and public access in the National Library of Medicine (NLM) (see pp. ST-3 and ST-4). NLM has operated these programs with additional support from the Institutes and Centers, and NIH leadership believes that consolidating funding and providing it directly to NLM will allow for more effective oversight and management of these important programs.

Opportunity, Growth, and Security Initiative

Three months ago, through the Bipartisan Budget Act of 2013 (BBA), Congress came together on a bipartisan basis and took an important first step toward replacing the damaging cuts caused by sequestration with longer-term reforms. Recognizing the importance of the two-year budget agreement Congress reached in December, the President’s Budget adheres to the BBA’s discretionary funding levels for FY 2015, giving Congress a roadmap for how to write a budget

at those levels that promotes growth and opportunity, enhances national security, and makes important reforms.

However, the BBA levels are not sufficient to expand opportunity to all Americans or to drive the growth our economy needs. The BBA replaced half the sequestration cut for FY 2014 but just one-fifth of the scheduled cut in the discretionary funding level for FY 2015. As a result, taking into account unavoidable growth in programs such as veterans' medical care and other factors, the BBA non-defense discretionary funding levels for FY 2015 are below the levels Congress provided in the bipartisan Consolidated Appropriations Act of 2014. They are also below the FY 2007 funding levels adjusted for inflation, even though the need for pro-growth investments in infrastructure, education, and innovation has only increased due to the Great Recession and its aftermath.

For that reason, the Budget also includes a separate, fully paid for \$56 billion Opportunity, Growth, and Security Initiative. This Initiative, which will be split evenly between defense and non-defense funding, shows how additional discretionary investments in FY 2015 can spur economic progress, promote opportunity, and strengthen national security. Moreover, the Opportunity, Growth, and Security Initiative is fully paid for with a balanced package of spending cuts and tax loophole closers, showing that additional pro-growth investments are easily affordable without increasing the deficit if Congress will enact common-sense spending and tax reforms.

At NIH, the Opportunity, Growth, and Security Initiative will support additional biomedical research investments that will increase understanding of underlying disease causes and spur development of innovative diagnostics, treatments, and preventive approaches to improve health, by providing an additional \$970 million to restore NIH to the level proposed in the FY 2014 President's Budget. The amounts shown would be in addition to the level for these activities proposed within the base Budget request (*e.g.*, while the base Budget request for the BRAIN Initiative is \$100 million, enactment of the Opportunity, Growth, and Security Initiative would bring that level to \$200 million). This list is not exhaustive and additional resources would be allocated strategically to support emerging research opportunities and other signature projects.

New and Competing Research Project Grants (RPGs) (\$280 million): This would provide funding for approximately 650 additional new and competing RPGs in FY 2015, for an estimated total of 9,976 awards when combined with the base Budget request estimate of 9,326 awards.

Alzheimer's Disease (\$100 million): Alzheimer's disease already afflicts five million Americans and costs the Nation approximately \$200 billion per year in health costs – and those numbers are predicted to rise steadily as the population ages. Recent advances in our understanding of the genetics and biology of the disease have identified new potential targets for innovative therapies to slow and ultimately prevent this devastating disease. Ramping up research, extending from basic studies of disease mechanism to clinical trials, is our best hope for turning around an increasingly serious public health problem.

BRAIN Initiative (\$100 million): The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative was announced by the President in April 2013. At NIH, an extraordinary team of neuroscientists has developed an exciting new plan to unlock the secrets

of brain function by defining the flow of information, or circuitry, among brain cells. Drawing on cutting edge technologies, this initiative is poised to revolutionize the diagnosis, prevention, and treatment of brain disorders. The first year (FY 2014) of funding for BRAIN at NIH is \$40 million, and a steep ramp-up in FY 2015 will allow this project to capture the momentum needed for ultimate success.

Big Data to Knowledge (BD2K) (\$90 million): Technological advances have fueled the generation of increasingly larger and more complex biomedical data sets. NIH's BD2K program will facilitate sharing of data among researchers across the nation, develop faster and more accurate analytical methods, and establish Centers of Excellence to help solve the most intractable Big Data problems to deepen our understanding of disease and speed translation of new treatments.

Accelerating Medicines Partnership (AMP) (\$50 million): Just announced on February 4, 2014, NIH has formed an unprecedented partnership with ten pharmaceutical companies to speed efforts identify new therapeutic drug targets, initially focusing on three disease areas in urgent need of better treatments: Alzheimer's disease, type 2 diabetes, and the autoimmune disorders lupus and rheumatoid arthritis. In FY 2015 there is an opportunity to expand AMP to two more diseases: schizophrenia would be one, and the other would be decided after industry consultation. These projects will serve as the foundation for an entirely new approach to the development of the next generation of drugs.

Vaccine Development (\$125 million): Recent advances in structural biology and immunology open an entirely new window to effective vaccine development for both HIV/AIDS and influenza. In both instances, key components of the virus have been identified that do not vary from year to year or strain to strain. This defines a multiyear pathway to an effective HIV vaccine and to a universal influenza vaccine that could greatly reduce the potentially catastrophic outcome of the next influenza pandemic, and potentially reduce the need for yearly injections for seasonal flu.

**National Institutes of Health
FY 2015 Congressional Justification**

Evidence and Innovation Strategies

The American public has entrusted the NIH with the Nation's largest investment in biomedical research. As a steward of public funds, the NIH is responsible for using its resources effectively to address the many health challenges that face our nation and the world. The NIH uses a well-established, rigorous decision-making process that relies on scientific expertise and stakeholder input when reviewing proposed projects and setting research priorities, while it continually seeks to improve its ability to assess the value of the research it supports. By enhancing the understanding of the results of its activities, the NIH can continue to make informed decisions for future investments and further increase the value it provides to society.

Systematically and comprehensively capturing improvements in public health that can be clearly linked to the public's investment in the NIH-funded research remains a challenge. By its nature, research is a long-term endeavor. Research outcomes cannot be foreseen with certainty, and unplanned results are common, which often provide new information that increases our understanding and may lead to redirecting the course of research activities. In some cases, the downstream impact or application of research findings is not known without further development by other entities. Despite the inherent challenges in evaluating biomedical research programs, the NIH has long engaged in activities to build a strong evidence base for current and future programs.

The NIH uses portfolio analysis tools to enhance analytic capabilities to extract meaningful information about fields of science, characteristics of research portfolios, and the outputs of research funding. Such analyses can inform the NIH about research needs and opportunities and priority setting both within and across the organization. The agency is actively identifying and developing new tools that expand and advance NIH-wide efforts in portfolio analysis; applying and disseminating current and newly developed tools to analyze biomedical research funding and the resulting impact; and promoting trans-NIH coordination of portfolio analysis activities and enhancing collaboration and training on these efforts. Portfolio analysis efforts have already proven useful in decision-making. For example, all concepts that are selected for potential funding by the Common Fund undergo portfolio analysis to understand the current state of the science in each field and identify the research goals and unique opportunities where a Common Fund investment can have the greatest impact.

The NIH also relies on program evaluation to generate a broad range of information about program performance and its context to support decision-making. Depending on its focus, an evaluation may examine the operations and outputs of a program, the extent to which program goals have been achieved, the factors that have impeded or contributed to its success, or how it may be modified to be more efficient and effective. Evaluation results are used to develop recommendations to provide appropriate level of support to a program, restructure program components, modify program goals, and/or support other program activities. The NIH frequently engages outside experts, such as the National Academy of Sciences, to conduct objective evaluations and provide independent, credible reports that offer advice and strategies to inform future research studies and investments.

To better support a wide range of analytic and evaluation activities, the NIH is working to strengthen its data and information technology infrastructure. In 2013, the Research Portfolio Online Reporting Tools (RePORT) program and several other NIH program analysis and reporting infrastructure initiatives were organized into a single entity for a coordinated NIH-wide effort. The NIH has begun to build an infrastructure that integrates the agency's administrative data on research programs with other sources of information to support evidence-based decision-making, including the long-term results of NIH-funded research found in research publications and patents. Some of this information has already been made publicly available in the RePORT Expenditures and Results database at <http://projectreporter.nih.gov>. Efforts are currently underway to increase the data integration and informatics capabilities needed to support assessment projects.

In addition, the new Research Performance Progress Report (RPPR) was recently implemented at the NIH. The RPPR will be used by all Federal agencies that award research and development grants, and will collect data on scientific products such as publications, patents, databases, software, new animal models, curricula, protocols, clinical interventions, and other data that result from the NIH's research funding. This effort to develop a standard method for documenting research products across the NIH and across the Federal government not only reduces the burden for grantees, but also provides a better foundation for making linkages across datasets, and has the potential to produce outcomes reporting that enables cross-agency comparisons.

Both the generation of knowledge and the application of that knowledge to health, as well as the impacts of these pursuits on the broader society, are vital parts of the NIH's value. A better understanding of all aspects of the NIH's work will lead to increased efficiency and effectiveness of that work. In 2013, the NIH Director charged the Scientific Management Review Board (SMRB), one of the agency's advisory groups, with identifying the best methods and strategies for assessing the value of NIH-supported research. NIH is working to identify strategies to implement the SMRB recommendations that will use a more comprehensive, systematic, and strategic approach to build the evidence base for biomedical research.

**Key Outputs and Outcomes Table
(NIH)**

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
SRO-2.1 By 2015, evaluate islet transplantation in combination with immune modulation strategies for the treatment of type 1 diabetes in clinical trials. (Outcome)	FY 2013: Enrollment in CIT-07 was completed in FY 13, and enrollment in CIT-06 is near completion. Target: Complete enrollment in CIT-07 (Phase III trial); continue to enroll in CIT-06 (Phase III trial). (Target Met)	Perform the primary endpoint analysis in CIT-07, which is a clinical trial of islet transplantation (alone) in Type 1 diabetes.	Evaluate islet transplantation in combination with immune modulation strategies for the treatment of type 1 diabetes in clinical trials.	N/A
SRO-2.8 By 2013, advance two emerging new strategies for treating muscular dystrophy to the point of preparedness for clinical trials. (Outcome)	FY 2013: The small molecule biglycan as well as antisense oligonucleotides are two therapies that have successfully treated symptoms of muscular dystrophy in animal models. Target: Test two new strategies for treating muscular dystrophy in preclinical models. (Target Met)	N/A	N/A	N/A
SRO-2.9 By 2015, advance understanding of social determinants of health and health disparities using multilevel, trans-disciplinary team science approaches by developing intervention models of how various factors affect individual health outcomes and their distribution in populations. (Outcome)	FY 2013: Teams of trans-disciplinary scientists at NIH Centers for Population Health and Health Disparities have developed multilevel intervention strategies directed at more than just individual behavior change to prevent disease burden and improve public health. Target: Develop interventions directed at more than two factors (such as both individual level and social context) and more than just individual behavior change. (Target Met)	Test interventions at various levels to establish optimal strategies for reducing health disparities/inequities.	Implement intervention models for reducing health disparities/inequities in various populations and identify commonalities for interventions in various underserved populations.	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
SRO-2.10 By 2014 identify three clinical candidate compounds for rare or neglected diseases. (Outcome)	<p>FY 2014: Preclinical safety and efficacy testing has been completed for all four active pilot projects and early stage clinical testing has been initiated on the four lead compound series.</p> <p>Target: Conclude preclinical safety and efficacy tests and initiate early stage clinical testing in conjunction with regulatory efforts on the selected rare and neglected disease lead compound series</p> <p>(Target Exceeded)</p> <p>Measure achieved earlier than anticipated.</p>	Conclude preclinical safety and efficacy tests and initiate early stage clinical testing in conjunction with regulatory efforts on the selected rare and neglected disease lead compound series	N/A	N/A
SRO-2.11 By 2016, conduct studies of young children to determine whether the plant estrogens in soy formula produce hormone-like effects. (Outcome)	<p>FY 2013: 1,255 Infant Phase visits were completed.</p> <p>Target: Complete 100 Infant Phase study visits.</p> <p>(Target Exceeded)</p>	Complete 180 Infant Phase study visits	Finalize 8 datasets (including ultrasound, anthropometry and physical exam data) and begin analyses of these datasets.	N/A
SRO-3.1 By 2013, identify at least one clinical intervention that will delay the progression, delay the onset, or prevent Alzheimer's disease (AD). (Outcome)	<p>FY 2013: Treatment phase of the IVIG study was completed and results were analyzed and presented.</p> <p>Target: Complete treatment phase for the IVIg study and analyze data.</p> <p>(Target Met)</p>	N/A	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
SRO-3.4 By 2015, evaluate an HIV vaccine candidate in a test of concept (phase IIB) efficacy trial in order to move towards an HIV/AIDS vaccine. (Outcome)	<p>FY 2013: Researchers tested DNA/MVA vaccine in non-human primates and phase I trials; showing the induction of durable CD4 and CD8 T-cell and binding antibody responses.</p> <p>Target: Advance at least one promising candidate vaccine so that it is ready to move forward into a phase II trial. Previous target: Advance at least one promising candidate vaccine into a phase II trial.</p> <p>(Target Met)</p>	Initiate the early phase testing needed to advance a promising candidate vaccine into efficacy testing.	Initiate a suite of studies to support efficacy evaluation and licensure of an HIV vaccine.	N/A
SRO-3.5 By 2013, identify and characterize at least 2 human candidate genes that have been shown to influence risk for substance use disorders and risk for psychiatric disorders using high-risk family, twin, and special population studies. (Outcome)	<p>FY 2013: NIH researchers identified genomic variants that were associated with risk for alcohol dependence.</p> <p>Target: Complete genome wide association and functional studies and identify potential genomic variants associated with risk for substance use and/or psychiatric disorders.</p> <p>(Target Met)</p>	N/A	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
SRO-3.7 By 2013, develop at least two novel therapies for immune-mediated disease. (Outcome)	<p>FY 2013: Conducted follow-up and conducted laboratory studies to explore in greater detail pre- and post-therapy samples.</p> <p>Target: Conduct long-term follow-up of patients in the study of rabbit and horse ATG in the treatment of severe aplastic anemia, and conduct laboratory experiments to explore in greater detail pre- and post-therapy samples.</p> <p>(Target Met)</p>	Begin patient enrollment in a clinical trial for Behcet's disease.	Design a follow-up study that refines therapeutic dosages of anakinra or targets a second pathway using IL-1 β monoclonal antibodies in Behcet's disease.	N/A
SRO-3.8 By 2017, determine the optimal tailored treatment regimen for patients with early stage breast cancer that maximizes the benefits of chemotherapy while minimizing the side-effects of unnecessary treatment. (Outcome)	<p>FY 2013: Due to major changes in the cooperative group trials network in FY 13, the first in 50 years, only 50% of the hormone receptors were done in 2013 as opposed to 60%. The results from the ER testing will not be released until the definitive trial results have been obtained; this delay will not impact the timing of the reporting of the results.</p> <p>Target: Complete hormone receptor scoring for 60% of all cases.</p> <p>(Target Not Met)</p>	Complete hormone receptor scoring for 90% of all cases.	Complete hormone receptor scoring for 100% of cases.	N/A
SRO-3.9 By 2020, identify two molecular-targeted therapies for disorders of the immune system in children. (Outcome)	<p>FY 2013: Researchers have identified a genetic variant that confers an increased risk of developing systemic juvenile idiopathic arthritis (sJIA) and that indicates the CD4+ T cell activation pathway as a therapeutic target.</p> <p>Target: Identify at least one</p>	Design a clinical trial testing an agent for a disorder of the immune system in children (e.g., Still's disease).	Complete a clinical pilot study in patients with a pediatric cohort of patients with a disorder of the immune system in children.	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	molecular pathway suitable for targeting in the patient cohort by performing detailed genetic mapping and confirmatory analyses for markers and pathways identified through genome-wide association. (Target Met)			
SRO-3.10 By 2017, advance two candidate medications for treatment of substance use disorders to clinical studies in humans. (Outcome)	FY 2013: A pharmacogenetic study of the medication ondansetron revealed that variations in two different genes predict effectiveness in treating alcohol dependence. Target: Conduct pharmacogenetic studies to identify genetic variations that influence treatment response to one compound. (Target Met)	Conduct human laboratory studies on one candidate compound.	Conduct Phase 2 clinical testing of a novel compound	N/A
SRO-3.11 By 2017, advance the discovery of high need cures through innovations in the therapeutics discovery and development process, by developing 3-D human tissue chips that accurately model the structure and function of human organs. (Outcome)	FY 2013: All of the Tissue Chip for Drug Screening initiative grantees were funded for a second year, as they all either met or exceeded their milestones, and there was continued close collaboration with DARPA and FDA. Target: Initiate research on the therapeutics discovery and development process and "high need cures" projects. (Target Met)	Achieve progress towards early milestones for three collaborative "high need cures" projects.	Advance three projects to integration of individual organ or system chips into a multiple tissue chip or organ microsystem.	N/A
SRO-5.12 By 2013, identify several potential targets and/or molecules that modulate or enhance the extinction of learned behaviors and conditioned associations supporting addiction, compulsion, or anxiety	FY 2013: Compounds such as ceftriaxone, which regulates brain glutamate activity, and L822429, a neurokinin-1 receptor antagonist, have been shown to enhance extinction of drug-seeking behavior for cocaine and alcohol,	N/A	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
disorders. (Outcome)	<p>respectively, and new data show that these compounds may also reduce relapse in animals self-administering other drugs of abuse such as nicotine (ceftriaxone) and alcohol (L822429).</p> <p>Target: Test whether compounds that have been shown to affect the extinction of drug seeking behavior for some drugs of abuse are equally effective against other drugs of abuse. (Target Met)</p>			
SRO-5.13 By 2015, establish and evaluate a process to prioritize compounds that have not yet been adequately tested for more in-depth toxicological evaluation. (Outcome)	<p>FY 2013: The 10,000 compound library was screened in 33 qHTS assays and data was analyzed on 179 compounds screened for cytotoxicity across 1086 human lymphoblastoid cell lines representing 9 racial groups to assess genetic diversity in response to toxicants.</p> <p>Target: Test 10,000 compound main library in 25 qHTS and test 180 compounds in densely sequenced human lymphoblastoid cell lines to assess genetic diversity in response to toxicants.</p> <p>(Target Met)</p>	Test 10,000 compound main library in an additional 15 qHTS and test 20 subsets of possible high risk chemicals in high-content screens.	A formal process of prioritizing compounds for more extensive toxicological testing will be evaluated and used	N/A
SRO-5.14 By 2013, reduce tobacco prevalence among youth by preventing initiation and increasing rates of cessation. (Outcome)	FY 2013: NIH identified evidence-based strategies to reduce tobacco prevalence among low income youth and adult populations. Smokefree Teen (teen.smokefree.gov) provides youth with evidence-based tools,	N/A	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	resources, and strategies for tobacco cessation. Target: Identify best evidence-based strategies to reduce tobacco prevalence among youth by preventing initiation and increasing rates of cessation. (Target Met)			
SRO-5.15 By 2018, develop, refine and evaluate evidence-based intervention strategies and promote their use to prevent substance use, abuse, addiction and their consequences in underage populations. (Outcome)	(Will begin reporting in December 2014) (In Progress)	Develop materials to help academic officials address underage and harmful drinking and other substance use by their students.	Evaluate the effectiveness of screening and brief intervention for alcohol and other drug use in a variety of settings.	N/A
SRO-6.4 By 2015, identify and characterize two molecular pathways of potential clinical significance that may serve as the basis for discovering new medications for preventing and treating asthma exacerbations. (Outcome)	FY 2013: The Severe Asthma Research Program is conducting investigations. Target: Conduct investigations to elucidate the dynamic, pathophysiologic phenotypes of severe asthma. (Target Met)	Investigate the disease processes involved in asthma exacerbations and/or severe asthma using state-of-the-art pulmonary imaging techniques.	Identify and characterize two molecular pathways of potential clinical significance that may serve as the basis for discovering new medications for preventing and treating asthma exacerbations.	N/A
SRO-6.5 By 2014, develop and evaluate two new interventions for the prevention and/or treatment of HIV disease utilizing the newly restructured HIV/AIDS clinical trials networks. (Outcome)	FY 2013: The Vaginal and Oral Interventions to control the Epidemic (VOICE) study (MTN 003) to compare the safety and acceptability and efficacy of oral pre-exposure prophylaxis (PrEP) and topical microbicides for prevention of sexual transmission of HIV in women was completed. Target: Complete the first study to compare the safety,	Evaluate non-tenofovir based strategies for HIV pre-exposure prophylaxis (PrEP) in men who have sex with men and women who are at increased risk of HIV infection in the U.S. In addition,	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	acceptability and efficacy of oral pre-exposure prophylaxis (PrEP) and topical microbicides for prevention of sexual transmission of HIV in women. (Target Met)	complete an evaluation of a comprehensive test, link, and care "plus" strategy for HIV prevention in New York City, Washington, DC, and four comparator cities in the U.S.		
SRO-6.6 By 2015, provide at least one new or significantly improved minimally-invasive treatment for clinical use in patients using image-guided interventions. (Outcome)	FY 2013: Development was completed on image guided interventions for assessing involvement of lymph nodes in cancer, skin cancer and for the treatment of cardiac arrhythmias. Target: Conduct one additional feasibility study on new IGI technologies for the diagnosis of lymph node cancer, treatment of skin cancer, and treatment of cardiac arrhythmias. (Target Met)	Identify how the use of a new or emerging IGI technology affects physician performance, or what physician training is necessary.	Support new or significantly improved human subject research for image-guided interventions to reduce the risk of adverse outcomes to structures such as the brain, spinal cord, or nerves that are within or near the operating field.	N/A
SRO-7.11 (RA) By 2013, gather sufficient data to support the development of a national standard for normal fetal growth. (Outcome)	FY 2013: The data management structure accepted imaging data and data collection to support a national standard for normal fetal growth is complete. Target: Complete data collection to support the development of a national standard for normal fetal growth. (Target Met)	N/A	N/A	N/A
SRO-8.7 By 2018, identify three effective system interventions generating the implementation,	FY 2013: NIH researchers identified three influences on sustainability of research-tested interventions in service systems such as	Identify three effective implementation strategies that enhance the	Identify three (3) key factors influencing the scaling up of research-tested	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
sustainability and ongoing improvement of research-tested interventions across health care systems. (Outcome)	<p>primary care, specialty care, and community practice: Community Development Teams in child mental health service systems; barriers and facilitators to evidence-based interventions to control blood pressure in community practice; and a set of factors to enhance sustainability of health care interventions across multiple settings.</p> <p>Target: Identify three key factors influencing the sustainability of research-tested interventions in service systems such as primary care, specialty care, and community practice.</p> <p>(Target Met)</p>	sustainability of research-tested interventions in service systems such as primary care, specialty care and community practice.	interventions across large networks of services systems such as primary care, specialty care and community practice. (Outcome)	
SRO-8.9 By 2014, identify 12 pathogen and/or host factors critical for understanding the molecular and cellular basis of pathogenesis of Category A-C biodefense pathogens and/or pathogens causing emerging infectious diseases. (Outcome)	<p>FY 2013: Twenty pathogens and/or host factors, including those that cause: dengue, hepatitis, TB, SARS, influenza, Marburg, E. coli, tularemia, Burkholderia infection, Rift Valley Fever, plague, arenavirus infection, Q fever, rabies, smallpox, botulism, were identified that are critical for understanding pathogenesis and show promise for the development of new therapeutics.</p> <p>Target: Identify three pathogens and/or host factors.</p> <p>(Target Exceeded)</p>	Identify four pathogen and/or host factors.	N/A	N/A
SRO-9.2 By 2018, identify culturally appropriate, effective stroke prevention/intervention programs in minority	FY 2013: Completed testing of a culturally tailored intervention in an underserved minority community and demonstrated an increased	Develop a protocol for testing a new prevention and/or intervention	Initiate enrollment in two studies testing culturally tailored interventions to	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
communities. (Outcome and Efficiency)	<p>proportion of patients with acute stroke who arrived at the hospital rapidly and were treated with tissue plasminogen activator.</p> <p>Target: Complete testing of a culturally tailored intervention to improve stroke awareness and time to hospital arrival in order to increase utilization of tissue plasminogen activator (tPA) treatment in minority populations.</p> <p>(Target Met)</p>	program that aims to reduce a major cause of disparities in stroke in minority communities.	reduce health disparities in stroke.	
SRO-9.4 By 2014, develop and evaluate the efficacy of neonatal screening for congenital cytomegalovirus (CMV) infection to permit identification of infants who will develop CMV-induced hearing loss in the first years of life. (Outcome)	<p>FY 2013: An interim report on the longitudinal study of infants infected with CMV determined that 6.3% of infants born infected with CMV yet with no clinical symptoms will develop hearing loss in the first years of life.</p> <p>Target: Provide an interim report on how many children identified with neonatal asymptomatic CMV-infection have developed hearing loss.</p> <p>(Target Met)</p>	Develop and evaluate the efficacy of neonatal screening for congenital cytomegalovirus (CMV) infection to permit identification of infants who will develop CMV-induced hearing loss in the first years of life.	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
SRO-9.5 By 2015, assess the efficacy of long-term oxygen treatment in patients with COPD and moderate hypoxemia. (Outcome)	FY 2013: LOTT recruited 643 participants. Target: Continue recruitment to 626 subjects. (Target Met)	Complete recruitment (737 total subjects).	Complete data analysis and publish results of study assessing the efficacy of long-term oxygen treatment in patients with COPD and moderate hypoxemia.	N/A
CBRR-1.1 Provide research training for predoctoral trainees and fellows that promotes greater retention and long-term success in research careers. (Output)	FY 2013: Award rate to comparison group reached 11%. Target: N > 10% (Target Met)	N > 10%	N > 10%	N/A
CBRR-1.2 Provide research training for postdoctoral fellows that promotes greater retention and long-term success in research careers. (Output)	FY 2013: Award rate to comparison group reached 13% and exceeded the target by 3%. Target: N > 10% (Target Met)	N > 10%	N > 10%	N/A
CBRR-2 Promote data sharing and provide information in real time through the NIH Business System (NBS) by developing, integrating, deploying and maintaining business modules. (By FY 2014, the NBS will be in an ongoing status) (Output)	FY 2013: Maintained post deployment support for Animal Procurement. Target: (Maintenance [Mat]) Maintain deployed business modules. * Planned - Service and Supply Activities Fund Module [Dep.2012] *Planned - Animal Procurement [Dep. 2013] (Target Met) FY 2013: Deployed Animal Procurement. Target: (Deployment [Dep])	Development [Dev] Initiate development of planned business modules to build capacity and functionality of the NIH Business System. * Planned - Oracle 12i Upgrade [continuation from Dev. start in 2012, thru 2015/Int.2015-16]	Development [Dev] Initiate development of planned business modules to build capacity and functionality of the NIH Business System. * Planned - Oracle 12i Upgrade [continuation from 2014/Int.2015-16] (Integration	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	<p>Conduct priority deployment activities to enable user accessibility and skill development within 2 years from the onset of integration. * Planned - Animal Procurement</p> <p>(Target Met)</p> <p>FY 2013: Completed integration for Animal Procurement.</p> <p>Target: (Integration [Int]) Complete integration activities for full functionality and usability of priority modules for successful development efforts within 3 years of initiated development. * Planned - Animal Procurement [Dev.2013/Dep.2014]</p> <p>(Target Met)</p> <p>FY 2013: Initiated development of Animal Procurement.</p> <p>Target: (Development [Dev]) Initiate development of planned business modules to build capacity and functionality of the NIH Business System.* Planned - Animal Procurement [Int.2013]</p> <p>(Target Met)</p>		<p>[Int]) Complete integration activities for full functionality and usability of priority modules for successful development efforts within 3 years of development. * Planned - Oracle 12i Upgrade [Dev.2012, 2014-15/Dep.2016]</p>	
<p>CBRR-6.2 By 2013 complete construction/commissioning of 15 biocontainment facilities to support biodefense and emerging infectious disease</p>	<p>FY 2013: The Regional Biocontainment Laboratory (RBL) project at the University of Hawaii has been suspended by the University and the orderly closeout of the project,</p>	<p>N/A</p>	<p>N/A</p>	<p>N/A</p>

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
research needs, including research on Category A-C Priority agents and newly emerging infectious diseases. (Output)	including the return of funds to the Federal government, is in process. Early in the planning process, the University had challenges securing the required matching funds for construction; ultimately, its inability to secure a viable site for construction caused the demise of the project, despite significant attempts by NIH to provide assistance. Target: Conduct design development Previous target: Begin construction on final research facility. (Target Not Met)			
CBRR-10 Make freely available to researchers the results of 400 high-throughput biological assays screened against a library of 300,000 unique compounds, and the detailed information on the molecular probes that are developed through that screening process. (Outcome)	FY 2013: Established 570 primary biochemical, cell-based or protein-protein interaction assays that were miniaturized and automated as high throughput screens in the Molecular Libraries Program (MLP) Portfolio. Target: Establish 400 primary biochemical, cell-based or protein-protein interaction assays that can be miniaturized and automated as high throughput screens in the Molecular Libraries Program (MLP) Portfolio. (Target Exceeded)	Increase the Molecular Libraries Program (MLP) inventory to 375 small molecule probes that can be used in biological research to interrogate basic biological processes or disease.	Make freely available to researchers the results of 400 high-throughput biological assays screened against a library of 300,000 unique compounds, and the detailed information on the molecular probes that are developed through that screening process.	N/A
CTR-1 By 2014, reduce the disparity between African American and white infants in back sleeping by 50% to further reduce the risk of sudden infant death syndrome (SIDS). (Outcome and Efficiency)	FY 2013: The NIH successfully conducted three meetings with up to nine federal agencies in attendance to determine outreach strategies to reduce the number African American infants who die from SIDS.	Conduct a SIDS risk-reduction training workshop at the National Baptist Convention's annual meeting session, which has an	N/A	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	<p>Target: Convene two meetings with two or more federal agencies on how to coordinate efforts to reduce SIDS in African American communities across the nation.</p> <p>(Target Exceeded)</p>	attendance of approximately 10,000 African American church delegates from across the country.		
CTR-10 By 2014, expand the scope of the Hazardous Substances Data Bank to include 14 nanomaterials. (Outcome)	<p>FY 2014: The Hazardous Substances Data Bank was augmented to include 14 nanomaterials.</p> <p>Target: Augment the Hazardous Substances Data Bank with comprehensive records for 5 nanomaterials.</p> <p>(Target Met)</p> <p>Measure achieved earlier than anticipated.</p>	Augment the Hazardous Substances Data Bank with comprehensive records for 5 nanomaterials.	N/A	N/A
POI-2 Utilize performance-based contracting (PBC). (ongoing) (Output)	<p>FY 2013: Obligated 38% of eligible service contracting dollars through performance-based contracting.</p> <p>Target: Obligate the FY 2013 OMB/OFPP goal of eligible service contracting dollars to PBC.</p> <p>(Target Not Met)</p>	Obligate the FY 2014 OMB/OFPP goal of eligible service contracting dollars to PBC.	Obligate the FY 2015 OMB/OFPP goal of eligible service contracting dollars to PBC.	N/A
POI-6.1 Improve facility conditions in order to reach and maintain a Condition Index (CI) weighted average of 85 or above (CIwa≥85).	<p>FY 2013: The condition of the facilities portfolio reached a CIwa of 80.96.</p> <p>Target: CIwa = 75.4</p> <p>(Target Exceeded)</p>	CIwa = 72.1	CIwa = 79.9	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
POI-6.2 By 2017, maintain the annual condition of buildings and facilities portfolio so that no less than 95% of occupied gross square feet (GSF) will have a CI greater than 65.	FY 2013: 73% of occupied gross square feet (GSF) reached a CI greater than 65. Target: 69.6% (Target Exceeded)	73.1%	73.5%	N/A
POI-7.1 Manage all Buildings and Facilities (B&F) line item projects so it is completed within 100% of the final approved project cost	FY 2013: The eight (8) active Recovery Act funded projects at the HHS Facility Project Approval Agreement (FPAA) threshold were managed effectively to ensure completion within 100% of the final approved project cost. Target: (2013 RA) 8 Active Recovery Act projects (Target Met) FY 2013: Nine (9) of the twelve (12) active non-Recovery Act funded projects at the HHS Facility Project Approval Agreement (FPAA) level threshold were effectively managed to ensure completion within 100% of the final approved project cost. Target: 12 Active Projects (Target Not Met)	12 Active Projects 3 Active Recovery Act projects	11 Active Projects 1 Active Recovery Act projects	N/A
POI-7.2 Manage design and construction of capital facility projects funded by B&F so that no more than 10% of the projects may incorporate plus or minus 10% adjustments of the approved scope	FY 2013: The design and construction of the eight (8) active reportable Recovery Act funded projects was managed effectively so that no more than 10% of the projects incorporated a plus or minus 10% adjustment of	12 Active Projects 3 Active Recovery Act projects	11 Active Projects 1 Active Recovery Act projects	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	<p>the approved scope.</p> <p>Target: (2013 RA) 8 Active Recovery Act funded Project (Target Met)</p> <p>FY 2013: The design and construction of ten (10) of the twelve (12) active non-Recovery Act funded projects was managed effectively so that no more than 10% of the projects incorporated a plus or minus 10% adjustments of the approved scope. One (1) project was canceled and the work incorporated under another project for costs savings. Another project was delayed to support further analysis of the most viable programmatic and facilities solution.</p> <p>Target: 12 Active Projects (Target Not Met)</p>			
<p>POI-8.1 By 2013, ensure that 100% of grantees have met all construction requirements, including NIH approved design and construction documents that ensures proposed research in the space is feasible, and ensures that grantees will take action to file or record a Notice of Federal Interest that ensures grantees cannot lease, sell or mortgage property without NIH approval. (Output)</p>	<p>FY 2013: Of the remaining ARRA awarded grantees, one grant was unable to complete all documents due to the devastation of Hurricane Sandy.</p> <p>Target: Ensure that 100% of 79 grantees have met all construction requirements. (Target Not Met)</p>	<p>N/A</p>	<p>N/A</p>	<p>N/A</p>

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
POI-8.2 By 2015, report the percent of extramural construction projects that are in compliance with the post award 20 year usage requirement to conduct research. (Output)	FY 2013: 99% of the extramural construction projects were in compliance with the post award 20 years usage requirement. Target: 95% of 219 projects are in compliance. (Target Met)	95% of 196 projects are in compliance.	95% of 212 projects are in compliance	N/A
POI-9 Reallocate laboratory resources based on external reviews by Boards of Scientific Counselors. (Output)	FY 2013: 25% of Principal Investigators were reviewed resulting in 25% of resources recommended to be reallocated Target: Conduct BSC reviews of 25% of Principal Investigators to assess quality of science in order to prioritize of resources. (Target Met)	Conduct BSC reviews of 25% of principal Investigators to assess quality of science in order to prioritize resources.	Conduct BSC reviews of 25% of principal Investigators to assess quality of science in order to prioritize resources.	N/A
SMHC-6 Provide opportunities for enhanced leadership skills to meet the challenges of workforce management and/or individual advancements. (Ongoing) (Output)	FY 2013: NIH reviewed literature and benchmarked other organizations to determine best practices in delivering executive coaching programs in the public sector and determine principles around which to operate the internal program. Target: Examine [EX] key area to enhance leadership skills. * Study best practices in implementing and evaluating executive coaching programs in the federal sector. [IM 2014] (Target Exceeded) FY 2013: NIH implemented recommendations from the previous year to offer a multifaceted program of	Examine [EX] key area to enhance leadership skills * Study NIH's administrative intern and fellows program to determine if there are improvements, efficiencies, or additional best practices that can enhance long-standing programs intended to recruit and develop the best and the brightest for future NIH leadership roles. [IM 2015]	Assess [AS] results of implementation * Assess results from implementing best practices in implementing and evaluating executive coaching programs in the federal sector. [IM 2014/EX2013] Implement [IM] recommendation from prior year assessments * Implement recommendation s from study of NIH's	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	<p>supervisory training geared towards meeting both the basic requirements of all new supervisors and the more varied needs of all existing supervisors.</p> <p>Target: Implement [IM] recommendation from prior year assessments. * Create and implement revised supervisory training. [EX.2012/AS.2014]</p> <p>(Target Exceeded)</p> <p>FY 2013: The Executive Onboarding Program analyzed the effectiveness of retaining employees. All new hires who participated remain at NIH, and every new executive continues to receive onboarding through the program.</p> <p>Target: Assess [AS] results of implementation. * Assess results from executive onboarding program. [IM 2012]</p> <p>(Target Exceeded)</p>	<p>Implement [IM] recommendation from prior year assessments * Implement best practices in implementing and evaluating executive coaching programs in the federal sector. [AS 2013]</p> <p>Assess [AS] results of implementation * Assess results from revised supervisory training. [IM 2013]</p>	<p>administrative intern and fellows program [EX 2014/ AS 2016]</p> <p>Examine [EX] key area to enhance leadership skills * Assess best practices and review the literature regarding incorporating the latest technologies into leadership development programs to determine which are most effective and practicable to create efficiencies and/or enhance learning [IM 2016/ AS 2017]</p>	
SMHC-7 Address diverse workforce recruitment needs to ascertain highly qualified staff to conduct or support biomedical research. (Ongoing) (Output)	<p>FY 2013: NIH developed a corporate recruitment strategy for FY13 enhancing partnerships, connecting talent, and streamlined pathways program recruitment. SMRF FY13 executed pilot "Career Experience Program" and Discover a Career initiative.</p> <p>Target: Implement [IM] key area to enhance recruitment *Develop corporate recruitment strategy to focus on diversity recruiting, student recruiting, and trans-</p>	<p>Implement [IM] key area to enhance recruitment *Increase oversight and review of Title 42 recruitment. [EX 2013] [AS 2015]</p> <p>Implement [IM] key area to enhance recruitment *Increase participation in</p>	<p>Assess [AS] results of implementation *Create the Scientific and Medical Recruitment Forum (SMRF) to attract world-class scientists and medical professionals to drive discovery and innovation at NIH. [IM 2014]</p>	N/A

Measure	Year and Most Recent Result / Target for Recent Result / (Summary of Result)	FY 2014 Target	FY 2015 Target	FY 2015 Target +/-FY 2014 Target
	<p>NIH hiring. [EX 2012] [AS 2014] *Create the Scientific and Medical Recruitment Forum (SMRF) to attract world-class scientists and medical professionals to drive discovery and innovation at NIH. [IM 2014] [AS 2015] (Target Met)</p> <p>FY 2013: Expanded the use of Pathways recruitments for the scientific community. Implemented and managed automated register and applicant referral process for management selection of candidates.</p> <p>Target: Examine [EX] key area to enhance recruitment *Implement Pathways Program to establish a focused student and entry level recruitment plan that supports succession planning efforts at NIH. [IM 2014] [AS 2015] (Target Met)</p> <p>FY 2013: NIH has developed an action plan to identify ways to enhance oversight and management of Title 42 cases and new procedures for exhaustion. In addition NIH is developing training on preparing cases.</p> <p>Target: Examine [EX] key area to enhance recruitment *Establish increased oversight and review of Title 42 recruitment. [IM 2014] [AS 2015] (Target Met)</p>	<p>Pathways Program to promote a focused student and entry level recruitment plan that supports succession planning efforts at NIH. [EX 2013] [AS 2015]</p> <p>Assess [AS] results of implementation and [IM] implement key areas to enhance recruitment *Evaluate corporate recruitment strategies: diversity and student recruiting, and trans-NIH hiring. [EX 2012] [IM 2013] *Develop the Scientific and Medical Recruitment Forum (SMRF) to continue attracting world-class scientists and medical professionals to drive discovery and innovation at NIH. [EX</p>	<p>Assess [AS] results of implementation *Implement Pathways Program to establish a focused student and entry level recruitment plan that supports succession planning efforts at NIH. [IM 2014] Assess [AS] results of implementation *Establish increased oversight and review of Title 42 recruitment. [IM 2014]</p> <p>Examine [EX] key area to enhance recruitment *Increase the use of Global Recruitments. [IM 2016] [AS 2017]</p> <p>Examine [EX] key area to enhance recruit *Launch a robust OHR succession planning effort to ensure OHR staff are available to meet the recruitment needs of NIH. [IM 2016] [AS 2017]</p>	

