DEPARTMENT OF HEALTH AND HUMAN SERVICES

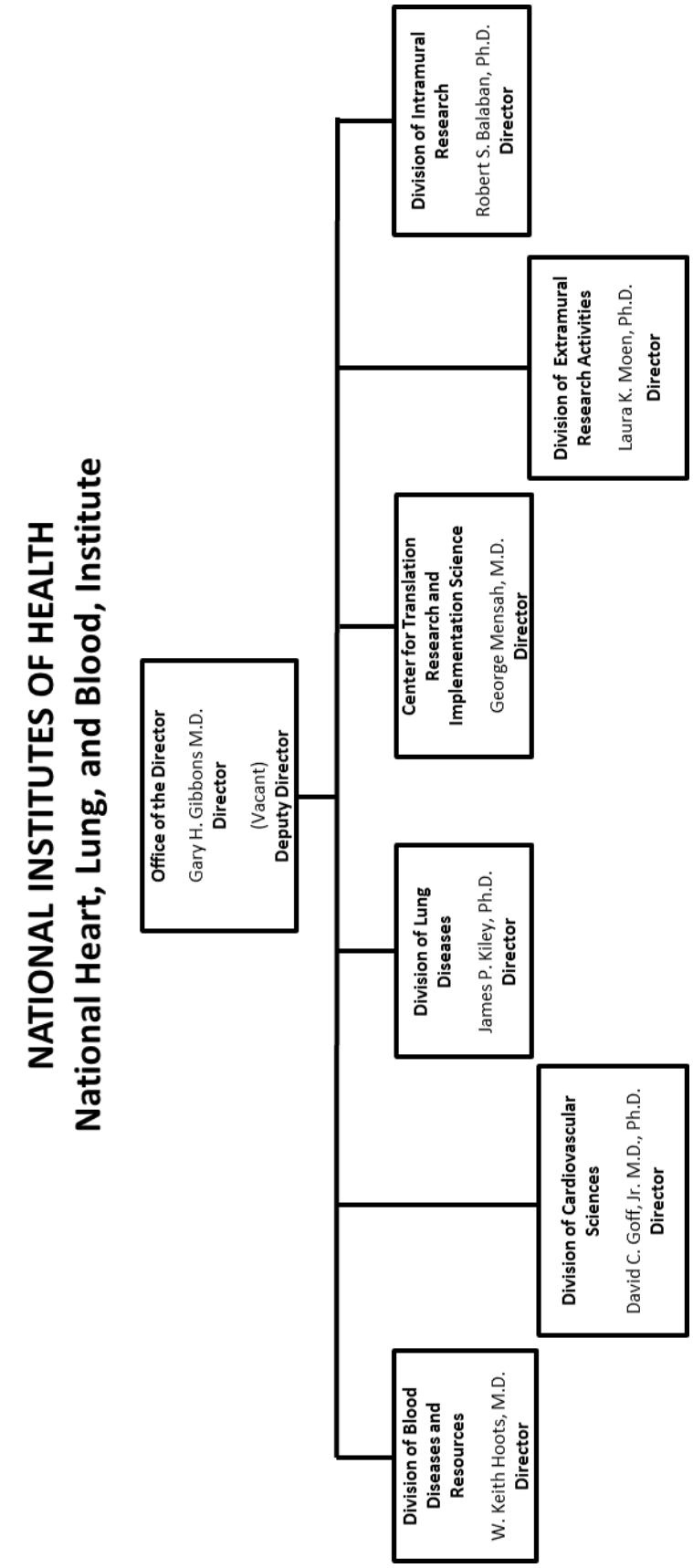
NATIONAL INSTITUTES OF HEALTH

National Heart, Lung, and Blood Institute (NHLBI)

FY 2020 Budget Page No.

Contents

NIH/NHLBI Organization Chart



Appropriation Language

NATIONAL INSTITUTES OF HEALTH

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, **[**$3,488,335,000**]***$3,002,696,000*.

Amounts Available for Obligation[1]

(Dollars in Thousands)

Source of Funding	FY 2018 Final	FY 2019 Enacted	FY 2020 President's Budget
Appropriation	$3,383,201	$3,488,335	$3,002,696
Mandatory Appropriation: (non-add)			
Type 1 Diabetes	$0	$0	$0
Other Mandatory financing	$0	$0	$0
Rescission	$0	$0	$0
Sequestration	$0	$0	$0
Secretary's Transfer	-$7,949	$0	$0
Subtotal, adjusted appropriation	$3,375,252	$3,488,335	$3,002,696
OAR HIV/AIDS Transfers	-$969	$0	$0
HEAL Transfer from NINDS	$0	$0	$0
Subtotal, adjusted budget authority	$3,374,283	$3,488,335	$3,002,696
Unobligated balance, start of year	$0	$0	$0
Unobligated balance, end of year	$0	$0	$0
Subtotal, adjusted budget authority	$3,374,283	$3,488,335	$3,002,696
Unobligated balance lapsing	-$129	$0	$0
Total obligations	$3,374,154	$3,488,335	$3,002,696

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2018 – $12,743 FY 2019 - $13,127 FY 2020 - $13,067

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2018 Final		FY 2019 Operating Level		FY 2020 President's Budget		FY 2020 +/- FY 2019 CR	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	2,686	$1,653,675	2,743	$1,666,314	0	$0	-2,743	-$1,666,314
Administrative Supplements	*(97)*	35,897	*(82)*	30,660	*(0)*	0	*(-82)*	-30,660
Competing:								
Renewal	129	93,585	174	102,199	0	0	-174	-102,199
New	862	465,762	908	513,083	0	0	-908	-513,083
Supplements	1	877	1	900	0	0	-1	-900
Subtotal, Competing	992	$560,224	1,083	$616,182	0	$0	-1,083	-$616,182
Subtotal, RPGs	3,678	$2,249,796	3,826	$2,313,156	0	$0	-3,826	-$2,313,156
SBIR/STTR	192	101,639	187	106,179	0	0	-187	-106,179
Research Project Grants	3,870	$2,351,435	4,013	$2,419,335	0	$0	-4,013	-$2,419,335
Research Centers:								
Specialized/Comprehensive	11	$21,647	11	$20,044	0	$0	-11	-$20,044
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	125	0	0	0	0	0	0
Comparative Medicine	0	455	0	955	0	0	0	-955
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	11	$22,227	11	$20,999	0	$0	-11	-$20,999
Other Research:								
Research Careers	685	$119,882	789	$145,222	0	$0	-789	-$145,222
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	49	20,484	50	21,712	0	0	-50	-21,712
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	0	0	0	0	0	0	0
Other	126	80,140	123	80,909	0	0	-123	-80,909
Other Research	860	$220,506	962	$247,843	0	$0	-962	-$247,843
Total Research Grants	4,741	$2,594,168	4,986	$2,688,177	0	$0	-4,986	-$2,688,177
Ruth L Kirchstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	420	$19,265	437	$19,650	0	$0	-437	-$19,650
Institutional Awards	1,587	96,056	1,619	97,930	0	0	-1,619	-97,930
Total Research Training	2,007	$115,321	2,056	$117,580	0	$0	-2,056	-$117,580
Research & Develop. Contracts	364	$310,656	377	$321,938	0	$0	-377	-$321,938
(SBIR/STTR) (non-add)	*(9)*	*(8,009)*	*(9)*	*(8,403)*	*(0)*	*(0)*	*(-9)*	*(-8,403)*
Intramural Research	456	215,445	487	219,661	0	0	-487	-219,661
Res. Management & Support	445	138,693	475	140,978	0	0	-475	-140,978
Res. Management & Support (SBIR Admin) (non-add)	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NHLBI	901	$3,374,283	962	$3,488,335	0	$0	-962	-$3,488,335

103.38%

1

Major Changes in the Fiscal Year 2020 President's Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that there may be overlap between budget mechansims and activity detail and these highlights will not sum to the total change for the FY 2020 budget request for the NHLBI, which is $3,002.7 million, a decrease of $485.6 million from the FY 2019 Appropropriated Level The FY 2020 President's Budget reflects the Administration's fiscal policy goals for the Federal Government. Within that framework, NHLBI will pursue its highest research priorities through strategic investments and careful stewardship of appropriated funds.

Research Project Grants (RPGs) (-$306.2 million; total $2,113.1 million):
NHLBI will fund 1,191 competing RPGs and approximately 2,381 noncompeting RPG awards totaling to $2,026.0 million, in FY 2020. Adjustments for special needs will be accommodated.

Research Centers (-$4.2 million; total $16.8 million):
A shift in the receipt of research applications that are normally supported under this mechanism to other Program Announcements and/or Funding Opportunity Announcements for research projects will reduce funding requirements in this mechanism and increase other research mechanisms.

Other Research (-$49.6 million; total $198.3 million):
NHLBI will reduce funding for Other Research by 20.0 percent which is a $49.6 million decrease compared to the FY 2019 enacted level of $247.8 million. Competing Other Research Projects are expected to decrease by approximately 7.9 percent or 194 grants. These reductions are distributed across all programmatic areas and basic, translational or clinical research.

Research and Development Contracts (-$57.5 million; total $264.4 million):
NHLBI will reduce funding for Research and Development Contracts by 17.8 percent which is a $57.5 million decrease compared to the FY 2019 enacted level of $321.9 million. These reductions are distributed across all programmatic areas and basic, translational or clinical research.

Intramural Research (-$30.5 million; total $189.1 million):
NHLBI will reduce funding for Intramural Research by 13.9 percent which is a $30.5 million decrease compared to the FY 2019 enacted level of $219.7 million. These reductions are distributed across all programmatic areas and basic, translational or clinical research.

Summary of Changes

(Dollars in Thousands)

FY 2019 Enacted	$3,488,335
FY 2020 President's Budget	$3,002,696
Net change	-$485,639

CHANGES	FY 2020 President's Budget		Change from FY 2019 Enacted	
	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2019 pay increase & benefits		$84,473		$130
b. January FY 2020 pay increase & benefits		84,473		1,844
c. Paid days adjustment		84,473		329
d. Differences attributable to change in FTE		84,473		0
e. Payment for centrally furnished services		35,351		-1,641
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		69,304		-31,195
Subtotal				-$30,533
2. Research Management and Support:				
a. Annualization of January 2019 pay increase & benefits		$71,121		$115
b. January FY 2020 pay increase & benefits		71,121		605
c. Paid days adjustment		71,121		280
d. Differences attributable to change in FTE		71,121		0
e. Payment for centrally furnished services		812		-1,452
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		54,955		-13,639
Subtotal				-$14,090
Subtotal, Built-in				-$44,623

Summary of Changes (Cont.)

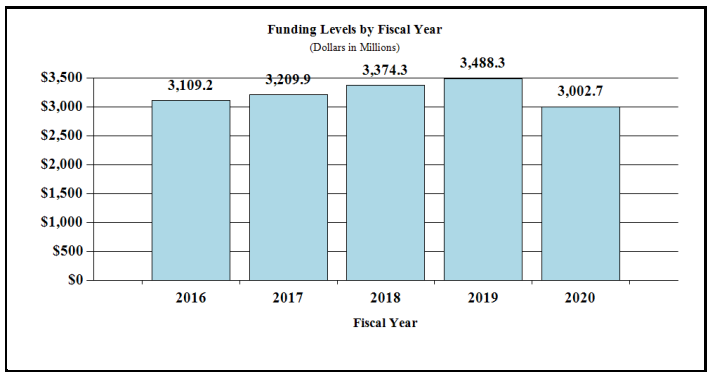
(Dollars in Thousands)

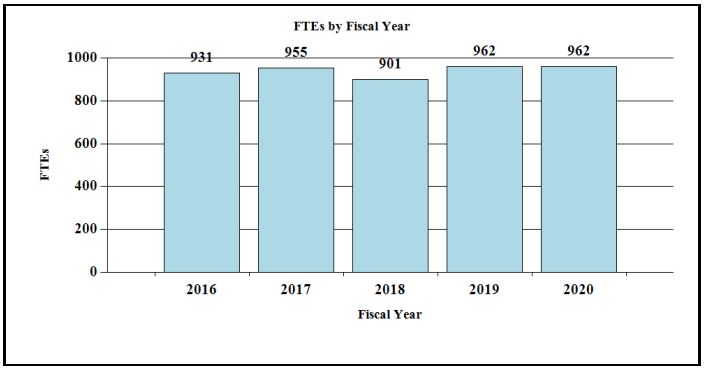
CHANGES	FY 2020 President's Budget		Change from FY 2019 Enacted	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	2,381	$1,358,193	-362	-$338,782
b. Competing	1,191	667,758	108	51,576
c. SBIR/STTR	153	87,150	-34	-19,029
Subtotal, RPGs	3,725	$2,113,101	-288	-$306,235
2. Research Centers	9	$16,799	-2	-$4,200
3. Other Research	768	198,275	-194	-49,569
4. Research Training	1,645	94,064	-411	-23,516
5. Research and development contracts	310	264,441	-67	-57,497
Subtotal, Extramural		$2,686,680		-$441,016
	FTEs		FTEs	

CHANGES	FY 2020 President's Budget		Change from FY 2019 Enacted	
	No.	Amount	No.	Amount
6. Intramural Research	487	$189,128	0	$0
7. Research Management and Support	475	126,888	0	0
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, Program	962	$3,002,696	0	-$441,016
Total changes				-$485,639

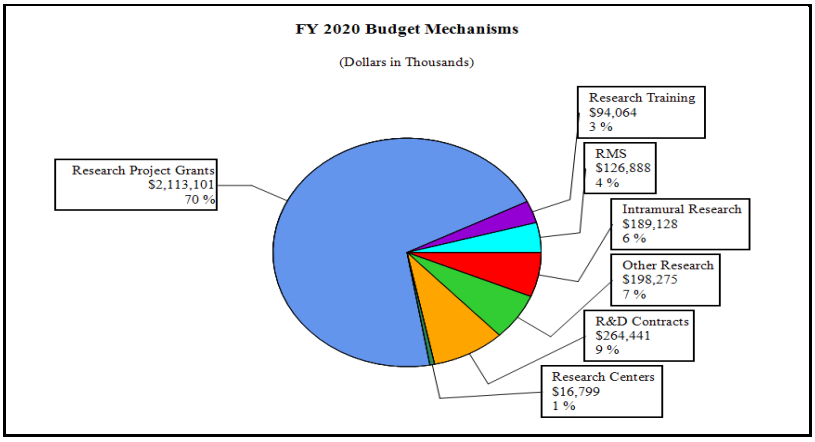
Fiscal Year 2020 Budget Graphs

History of Budget Authority and FTEs:

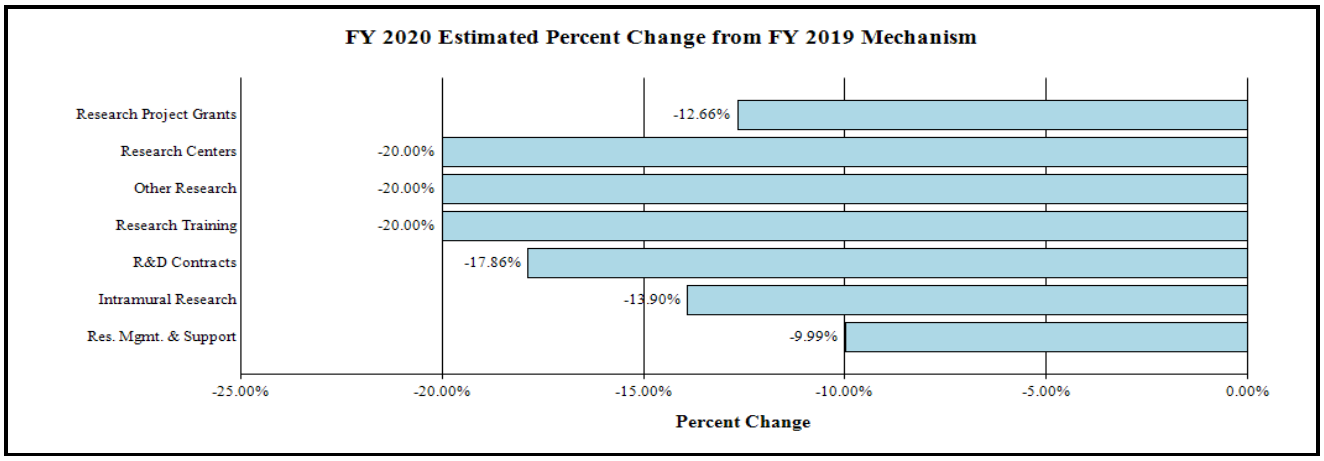




Distribution by Mechamism:



Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH

National Heart, Lung, and Blood Institute

Budget Authority by Activity[1]

(Dollars in Thousands)

	FY 2018 Final		FY 2019 Enacted		FY 2020 President's Budget		FY 2020 +/- FY2019	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Heart and Vascular Diseases		$1,854,940		$1,920,677		$1,647,699		$272,978
Lung Diseases		733,820		760,105		654,284		-105,820
Blood Diseases and Resources		431,384		446,914		384,696		-62,219
Subtotal, Extramural		**$3,020,145**		**$3,127,696**		**$2,686,680**		**-$441,016**
Intramural Research	**456**	**$215,445**	**487**	**$219,661**	**487**	**$189,128**	**0**	**-$30,533**
Research Management & Support	**445**	**$138,693**	**475**	**$140,978**	**475**	**$126,888**	**0**	**-$14,090**
TOTAL	**901**	**$3,374,283**	**962**	**$3,488,335**	**962**	**$3,002,696**	**0**	**-$485,639**

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

NATIONAL INSTITUTES OF HEALTH

National Heart, Lung, and Blood Institute

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2019 Amount Authorized	FY 2019 Enacted	2020 Amount Authorized	FY 2020 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$3,488,335,000	Indefinite	$3,002,696,000
National Heart, Lung, and Blood Institute	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$3,488,335,000		$3,002,696,000

NATIONAL INSTITUTES OF HEALTH

National Heart, Lung, and Blood Institute

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2011	$3,187,516,000		$3,182,524,000	$3,096,916,000
2011 Rescission				$27,192,768
2012	$3,147,992,000	$3,147,992,000	$3,036,189,000	$3,084,851,000
2012 Rescission				$5,830,368
2013	$3,076,067,000		$3,085,390,000	$3,079,020,632
2013 Rescission				$6,158,041
2013 Sequestration				($154,545,663)
2014	$3,098,508,000		$3,077,916,000	$2,988,605,000
2014 Rescission				$0
2015	$2,987,685,000			$2,997,870,000
2015 Rescission				$0
2016	$3,071,906,000	$3,035,062,000	$3,135,519,000	$3,115,538,000
2016 Rescission				$0
2017[1]	$3,113,533,000	$3,190,474,000	$3,242,685,000	$3,206,589,000
2017 Rescission				$0
2018	$2,534,803,000	$3,256,521,000	$3,322,774,000	$3,383,201,000
2018 Rescission				$0
2019	$3,112,032,000	$3,423,604,000	$3,490,171,000	$3,488,335,000
2019 Rescission				$0
2020	$3,002,696,000			

[1] Budget Estimate to Congress includes mandatory financing

Justification of Budget Request

National Heart, Lung, and Blood Institute

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.
Budget Authority (BA):

	FY 2018 Actual	FY 2019 Enacted	FY 2020 President's Budget	FY 2020 +/- FY 2019
BA	$3,374,283,000	$3,488,335,000	$3,002,696,000	-$485,639,000
FTE	901	962	962	0

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

Director's Overview

The National Heart, Lung, and Blood Institute (NHLBI) is the Nation's leading funder of research to advance the prevention and treatment of heart, lung, blood, and sleep disorders. For more than 70 years, NHLBI has been at the forefront of improving the Nation's health and reducing the burden of heart disease. Although heart disease remains the leading cause of death in the United States, the rate of heart disease deaths has declined by 70 percent over the past 50 years, thanks in part to NHLBI-funded research. This research also has informed guidelines to treat high blood pressure, generated new treatments for asthma and other debilitating lung diseases, and helped people with sickle cell disease live longer, fuller lives.

In FY 2020, NHLBI will continue to base its funding decisions and stewardship of Federal resources on the NHLBI Strategic Vision; ongoing engagement with scientific advisory bodies, patient groups, and other partners; and emerging scientific tools and opportunities. The Institute will continue to leverage its broad research portfolio in heart, lung, blood, and sleep biology, and will enhance its investments in fundamental discovery research, data science, the health needs of women and special populations, precision medicine, and workforce development.

Discovery Science as a Bedrock for Improving Health

Above all, NHLBI will retain its long-standing commitment to supporting fundamental discovery research and the people making these discoveries. Historically, investment in basic research has helped drive biomedical innovation, and it continues to yield gains in public health.

For example, decades of fundamental research on how the heart develops in early life are leading to exciting gains in understanding atrial fibrillation (AFib). AFib is the most common type of rapid, irregular heartbeat in the United States, and a risk factor for stroke and heart failure. There have been many advances in AFib treatment, but earlier intervention is needed, especially for women, who have higher rates of death and disability from AFib than men do.[1] Recently, in a large genome-wide association study that included about 60,000 people with AFib, NHLBI-

[1] www.ncbi.nlm.nih.gov/pubmed/27053455

funded researchers found that a number of genes known to be involved in heart development during early life also are associated with susceptibility to AFib.[2] These genes could help identify people at risk for AFib and serve as targets for more effective therapies.

Leveraging Data Science to Drive Precision Medicine

With the increasing capacity to collect complex biomedical data — and the unprecedented opportunities that this offers to advance precision medicine — the need for accessible, shareable, secure, and efficient methods to store and analyze data has never been greater. The NHLBI Strategic Vision expresses the Institute's commitment to leverage opportunities in data science by supporting the integration and analysis of data from multiple sources and modalities.

Genomic data from the NHLBI Trans-Omics for Precision Medicine (TOPMed) program makes up one of three massive datasets that researchers will be able to access and query during a pilot phase of the NIH Data Commons, a cloud-computing environment that is part of the NIH STRIDES (Science and Technology Research Infrastructure for Discovery, Experimentation, and Sustainability) initiative. Concurrently, the NHLBI Data Storage, Toolspace, Access and analytics for biG-data Empowerment (DataSTAGE) will integrate TOPMed and other datasets with analytical tools to add computing power for precision medicine research. Through DataSTAGE, NHLBI-funded investigators will be able to pursue innovative research questions by obtaining data from the NIH Data Commons and many other databases that were previously inaccessible. NHLBI also will continue to work with its partners to develop new datasets, such as a patient registry and data repository to better understand the needs of people with sickle cell disease, and to work toward curative genetic therapies.

The growth in researchers' ability to access and analyze large, diverse health-related datasets is already empowering new efforts to explore disease risk, prevention, and treatment. Recently, investigators with NHLBI's COPDGene study analyzed lung imaging, genomic, and clinical data from nearly 15,000 people, and found that a gene variant improved risk prediction for fibrotic lung disease when added to a risk algorithm that included age, sex, and smoking status.[3]

NHLBI-funded researchers also are beginning to use artificial intelligence of digital echocardiogram images to help identify patients with rare heart diseases.[4]

Leadership in Multi-Disciplinary Cross-cutting Research: Trans-NIH and Beyond

When the Nation looks to NIH to help improve public health and drive scientific innovation — in finding new treatments and cures for genetic diseases, addressing health disparities, stemming the opioid crisis, or pushing the field of regenerative medicine — NHLBI brings its expertise, commitment, and the power of its broad research portfolio to bear.

With its proficiency in blood diseases and genetic technologies, NHLBI is leading the Cure Sickle Cell Initiative, which aims to bring new genetic therapies for sickle cell disease (SCD)

[2] www.ncbi.nlm.nih.gov/pubmed/30061737
[3] www.ncbi.nlm.nih.gov/pubmed/28893869
[4] www.projectreporter.nih.gov/project_info_description.cfm?aid=9614825

into clinical trials in five years. This bold initiative is designed to be adaptive to evolving opportunities and needs, and will rely on a public-private partnership of patients, researchers, state and Federal agencies, professional medical societies, biotechnology firms, and other private sector partners all working together to accelerate curative therapies. As these partners work toward cures, NHLBI is striving for more immediate impacts to help people with SCD enjoy a higher quality of life, free from pain. For example, the Institute is leveraging efforts under the NIH Helping to End Addiction Long-term (HEAL) Initiative, which is supporting basic research on the mechanisms of pain and development of non-addictive pain therapeutics.[5]

NHLBI also coordinates the NIH Regenerative Medicine Innovation Project (RMIP), in collaboration with 11 other Institutes and the NIH Office of the Director, the Food and Drug Administration, and other Federal agencies. This initiative was authorized by the 21st Century Cures Act to support and accelerate clinical research using adult stem cells to repair or replace damaged cells, tissues, and organs.[6] The RMIP is galvanizing the field by supporting efforts to move potential stem cell-based therapies from laboratory studies into early-phase clinical trials.

Nurturing the Next Generation of Scientific Leaders

To build on NHLBI's legacy, and to meet the scientific and health challenges of tomorrow, the Institute is committed to nurturing a talented, diverse workforce. In alignment with the NIH Next Generation Researchers Initiative, NHLBI will continue to prioritize funding for early-stage investigators, and to provide training and career development opportunities that help fill critical scientific and public health needs.

To bring more physician-scientists into the workforce pipeline, NHLBI recently made awards to seven institutions as part of its new Stimulating Access to Research in Residency (StARR) program. The awards provide tools, mentorship, training, and funding needed to accelerate the entry of medical residents. For example, one StARR grant is focused on training pediatric residents to pursue careers in heart, lung, and blood research.[7] NHLBI also plans to fund up to five new Physician-Scientist Research Awards in both FY 2020 and in FY 2021 to support the independence of early-career physicians committed to research.[8]

NHLBI offers grants that enable both new and established investigators the flexibility to conduct high-risk, high reward research. The Institute's Outstanding and Emerging Investigator Awards provide funding for more open-ended research programs, rather than particular projects, for up to seven years instead of the five years covered by a traditional R01 grant; 65 awards have been made since the program's launch in FY 2017.

Overall Budget Policy: The FY 2020 President's Budget request is $3,002.7 million, a decrease of $485.6 million or 13.9 percent compared with the FY 2019 Enacted level.

[5] www.nih.gov/research-training/medical-research-initiatives/heal-initiative
[6] www.nih.gov/research-training/medical-research-initiatives/rmi
[7] www.projectreporter.nih.gov/project_info_description.cfm?aid=9596369
[8] www.grants.nih.gov/grants/guide/rfa-files/rfa-hl-19-015.html

Program Descriptions and Accomplishments

Cardiovascular Diseases: This program supports research to advance understanding, prevention, and treatment of pediatric and adult cardiovascular diseases (CVD), including heart attack, heart failure, vascular dementia, stroke, and congenital heart disease. Additionally, the program supports the development of innovative technologies for early detection and intervention in patients with CVD.

NHLBI-supported research on CVD continues to save lives by transforming clinical practice. For example, hypertension treatment guidelines released in 2017 by the American Heart Association and the American College of Cardiology recommend a new, lower blood pressure target, based on NHLBI's Systolic Blood Pressure Intervention Trial (SPRINT). The trial found that compared to a blood pressure target of less than 140 mm Hg, a reading of less than 120 mm Hg helped reduce deaths from heart attack and stroke, particularly among older, high-risk individuals with high blood pressure. Given the disproportionate burden of uncontrolled hypertension in African American and low-income populations, researchers are now working to develop and test the effectiveness of a multicomponent intervention for more intensive blood pressure control in these and other underserved groups.[9]

Researchers also are investigating whether treating to the lower blood pressure target has the added benefit of reducing the risk of age-related dementia or cognitive impairment. A subset of 2,800 SPRINT participants took part in the SPRINT Memory and Cognition IN Decreased Hypertension (SPRINT MIND) study. Preliminary results showed that new cases of mild cognitive impairment (MCI) were reduced by 19 percent, and the combined outcome of new MCI and probable dementia was reduced by 15 percent in the intensive treatment group compared to the standard group. This suggests that treatment of high blood pressure may reduce the risk of cognitive decline in older persons with high CVD risk.[10]

Other NHLBI long-established cohorts such as the Framingham Heart Study, the first long-term observational study of CVD, and the Jackson Heart Study, the largest-ever study of CVD in African Americans, also are looking more closely at the relationship between cardiovascular health and brain health. A recent analysis from the Framingham study showed that high blood pressure during mid-life increases dementia risk in late life, suggesting that management of blood pressure in mid-life may help protect against cognitive decline.[11]

To address heart disease and other conditions associated with Down syndrome, NHLBI is co-leading the trans-NIH INvestigation of Co-occurring conditions across the Lifespan to Understand Down syndromE (INCLUDE) program, which will focus on the critical health needs of children and adults with Down syndrome.[12] Congenital heart disease affects about half of all babies born with Down syndrome,[13] and is the most common birth defect in the United States overall, affecting an estimated 40,000 births per year. Sleep apnea affects millions of Americans, including a disproportionate number of people with Down syndrome. As part of the INCLUDE

[9] www.projectreporter.nih.gov/project_info_description.cfm?aid=9542891
[10] www.ncbi.nlm.nih.gov/pubmed/30175661
[11] www.ncbi.nlm.nih.gov/pubmed/29117954
[12] www.nih.gov/include-project
[13] www.cdc.gov/ncbddd/heartdefects/data.html

program, NHLBI expects to leverage its sleep cohort studies, the Gabriella Miller Kids First program, and the Pediatric Cardiac Genomics Consortium, which is using state-of-the-art approaches to define genetic pathways that contribute to congential heart disease. Recently funded projects seek to identify genes involved in Down syndrome-related malformations of the heart, and to identify sleep apnea treatments that will improve quality of life for children with Down syndrome.

Budget Policy:
The FY 2020 President's Budget request is $1,647.7 million, a decrease of $273.0 million or 14.2 percent compared with the FY 2019 Enacted level.

Program Portrait: Strengthening NHLBI's Investment in Population Studies to Understand Disease

FY 2019 Level: $12.1 million
FY 2020 Level: $10.8 million
Change: - $ 1.3 million

NHLBI's support for large population-based cohort studies, which began with the Framingham Heart Study in the 1940s, has made significant contributions to effective treatment and prevention of heart, lung, blood, and sleep disorders. Such cohort studies help reveal biological, lifestyle, and environmental factors associated with health and diseases, and generate testable hypotheses regarding the causes of disease and possible new interventions.

In August 2018, NHLBI renewed its support for the Jackson Heart Study. As the Nation's largest study looking at cardiovascular disease (CVD) risk factors in African Americans, this study is providing data to help better understand, prevent, and treat heart disease in the Jackson, Mississippi area and nationwide. The 2018-2024 phase of the study adds a new dimension by exploring the link between cardiovascular health and brain health, and the risk factors associated with cognitive decline. In December 2018, NHLBI also renewed its commitment for another seven years to support the Strong Heart Study, the largest study of CVD in American Indians. Since 1988, the study has followed more than 7,600 people from several tribal communities in Arizona, Oklahoma, and North and South Dakota. Both studies have been restructured to strengthen community engagement to ensure that community members have an active role in planning future research and in translating the results into public benefits.

NHLBI is committed to maximizing its investment in these and other established cohort studies, and recently announced the availability of funds to support novel hypothesis testing and data analyses that might not have been anticipated at the time of the original award. [14] A companion announcement solicited proposals for a new large cohort study to address research on heart, lung, blood, and sleep disorders that is not currently covered by ongoing epidemiological studies. [15]

Lung Diseases: This program conducts and supports research that expands our understanding of lung biology and how lung diseases start and progress, as well as basic and clinical studies that lead to new and improved ways to diagnose, treat, and prevent lung diseases. Research areas include asthma, chronic obstructive pulmonary disease (COPD), cystic fibrosis, sleep-disordered breathing, pulmonary fibrosis, lymphangioleiomyomatosis (LAM), pulmonary complications of AIDS and tuberculosis, pediatric lung diseases, and more.

[14] www.grants.nih.gov/grants/guide/pa-files/PAR-17-338.html
[15] www.grants.nih.gov/grants/guide/pa-files/PAR-18-577.html

A theme that permeates through NHLBI's broad lung disease portfolio is a commitment to improve patient outcomes by developing and delivering more precisely targeted therapies. To enable precision medicine, researchers first must have a basic understanding of disease.

A recent study shed light on the mechanisms of asthma by showing that allergens can trigger inflammatory cells known as neutrophils to form neutrophil extracellular traps (NETs). Neutrophils use NETs to trap and kill pathogenic bacteria, but the study found that generating NETs can cause neutrophils to release most of their vital components and leave behind empty cellular husks, which in turn can trigger inflammation.[16] Another group found that a noninvasive imaging technique, called multidetector computed tomography, can measure mucus accumulation and its association with airway dysfunction.[17] Understanding these processes could help identify subsets of patients who might benefit from a particular treatment.

Recognizing that asthma is a complex disease, with diverse mechanisms and outcomes, the NHLBI Lung Diseases program also supports clinical testing of interventions designed to meet the unique needs of patients with severe asthma. Through the Precision Interventions for Severe Exacerbation Prone Asthma Network (PrecISE), six Centers recently were established to test a series of FDA-approved treatments based on each patient's specific biology or biomarkers.

An NHLBI-funded clinical trial also recently dispelled a common practice regarding how to treat children with asthma. The trial found that temporarily increasing the dosage of inhaled steroids at the earliest sign of asthma flare-ups in children with mild-to-moderate asthma does not effectively reduce severe flare-ups.[18] This information is being shared with health care providers and caregivers to improve treatment practices. NHLBI also is partnering with researchers and professional societies to support updating the 2007 national guidelines for asthma care.[19] The Institute has supported completion of rigorous systematic evidence reviews addressing critical issues in asthma diagnosis and management, and has established a Federal Advisory Committee that will chart the path of translating new evidence into improved care guidelines for people with asthma.

Finding new targeted treatments for the progressive lung disease pulmonary fibrosis (PF) remains a high priority. The Institute is working to improve and standardize lung transplantations, which remain the only available therapy option for many patients with PF.[20] NHLBI-funded researchers are working to better understand mechanisms of the disease toward developing more effective therapies. For example, a recent study examined the role of the immune system in the development of PF, and found an increase in levels of a protein called PD-1 in helper T-cells, which are white blood cells that regulate the body's response to infection.[21] Blocking PD-1 and a related signaling pathway reduced signs of fibrosis in a mouse model of PF, suggesting that this pathway could be targeted effectively by drugs that are already FDA-

[16] www.ncbi.nlm.nih.gov/pubmed/30076281
[17] www.ncbi.nlm.nih.gov/pubmed/29400693
[18] www.ncbi.nlm.nih.gov/pubmed/29504498
[19] www.ncbi.nlm.nih.gov/pubmed/30036600
[20] www.grants.nih.gov/grants/guide/notice-files/NOT-HL-18-653.html
[21] www.ncbi.nlm.nih.gov/pubmed/30257954

approved for other conditions. In a large genetic study of idiopathic PF, researchers found that certain gene expression patterns in blood cells can predict a patient's response to therapy.[22] This work, coupled with information from NHLBI's TOPMed program, could help guide the choice of treatment, including identifying patients for whom lung transplant remains the best option.

Improving the quality of care for people with COPD, the Nation's fourth leading cause of death and a disease that is increasingly impacting women, is one of five goals established in the COPD National Action Plan, released by NHLBI and its partners in 2017. NHLBI and other Public Health Service agencies are collaborating to advance implementation of the plan. An ongoing collaboration of NHLBI with the Centers for Disease Control and Prevention has yielded new data showing that COPD is almost twice as common in rural versus urban areas. In light of this disparity, NHLBI and the Health Resources and Services Administration are discussing the potential to expand support for targeted approaches to reduce the burden of COPD in rural communities, such as the use of telemedicine to connect patients with pulmonary specialists.

NHLBI also is working to find ways to bring pulmonary rehabilitation to more patients in need, including those with PF and COPD,[23] especially for individuals in rural and hard-to-reach areas. One group of researchers is examining behavioral interventions to improve the effectiveness of home-based rehabilitation programs after COPD-related hospitalizations.[24]

Fundamental research on sleep, led by the National Center for Sleep Disorders Research at NHLBI, is advancing steadily. The groundbreaking discovery of genes involved in regulating sleep and circadian (daily) rhythms, which was recognized by the 2017 Nobel Prize in Medicine, has opened doors to a better understanding of the physiological mechanisms through which sleep deficiency and sleep disorders contribute to chronic disease and mortality. NHLBI is capitalizing on this new knowledge by partnering with other NIH Institutes to better understand the intersection between circadian rhythm and disease states, including its impact on women's health, obesity, sleep apnea, health disparities, and opioid use disorders. New funding opportunities released in October 2018 will support researchers who are working on trans-NIH efforts to curtail the opioid epidemic by better understanding the role of sleep in opioid use, dependence, addiction, and treatment responses.

[22] www.ncbi.nlm.nih.gov/pubmed/28942086
[23] www.grants.nih.gov/grants/guide/rfa-files/RFA-hl-18-019.html
[24] www.projectreporter.nih.gov/project_info_description.cfm?aid=9589299

Budget Policy:
The FY 2020 President's Budget request is $654.3 million, a decrease of $105.8 million or 13.9 percent compared with the FY 2019 Enacted level.

Program Portrait: LungMAP: Advancing Understanding of Lung Development and Pathology

FY 2019 Level: $6.5 million
FY 2020 Level: $6,.8 million
Change: +$0.3 million

To develop effective therapies for developmental lung diseases, researchers need to understand normal lung development and how it can be derailed. Moreover, for age-related lung diseases, a deeper understanding of lung development holds promise for approaches to repair or regenerate lung tissue by reactivating adaptive developmental pathways.

The lung is a complex organ, and little is known about how the human lungs develop from early in life through childhood. Ongoing studies suggest that the origins of some adult lung diseases occur early in life, and that developmental events have life-long consequences for respiratory health. For these reasons, the NHLBI Molecular Atlas of Lung Development (LungMAP) program supported the development of an online repository containing high-resolution images of human and mouse lung tissue throughout the lifespan. The repository currently contains more than 6000 images, including 3-D lung reconstructions.

To maintain and build LungMAP, NHLBI supports a consortium of four research centers, a data coordinating center, and a human tissue repository of donated lungs. The consortium has developed a complete atlas of mouse lung during early postnatal development that integrates gross lung anatomy with imaging and gene expression data. These gene expression data offer critical insights into the molecular pathways that regulate normal lung development, and thus offer clues toward understanding the cellular and molecular basis for lung diseases. Researchers are now in the process of developing an atlas of the human lung. Since the program's inception in 2014, more than 80 publications have cited LungMAP data.

Blood Diseases: The blood disease program supports research on the causes, prevention, and treatment of non-cancerous blood diseases including anemias, such as sickle cell disease and thalassemia, venous thromboembolism, malaria, and hemophilia. The program also assumes major responsibility in ensuring the adequacy and safety of the Nation's blood supply and in supporting scientific advances in stem cell biology, and new gene and cell-based therapies to repair and regenerate human tissues.

Efforts to bring new treatments forward for blood diseases, such as sickle cell disease (SCD), are proceeding at a rapid pace, due to advances in genetic therapies. In Fall 2018, NHLBI led the launch of the Cure Sickle Cell Initiative, which is leveraging the latest genetic discoveries and advances in related technology, such as gene editing tools, to bring genetic-based therapies safely into clinical trials within five years. This ambitious effort is unique in that it is patient-driven, with patients working alongside researchers to develop clinical trials and achieve recruitment goals, and includes a public-private partnership and broad collaboration among Federal agencies. It also includes the development of a robust data registry and repository that will be accessible to researchers working to improve the lives of patients with SCD.

As NHLBI and its partners continue to move toward more targeted gene and cell-based therapies, the Institute continues to improve bone marrow transplants, currently the only cure for SCD. Because this procedure is most safe and effective in young patients who have

immunologically matched donors, it is not an option for many patients. However, researchers are making progress to improve engraftment, or the ability of stem cells derived from bone marrow to grow and make healthy blood cells.

The hematopoietic, or blood-forming, stem cells (HSC) found in bone marrow can be isolated from circulating blood using injections of a protein (G-CSF) that stimulates the cells to leave the bone marrow. Not all donors tolerate these injections, which can be painful and may take several attempts. In a first-in-human study, NHLBI-funded researchers tested whether a molecule known as growth-regulated oncogene beta (GRObeta), or a combination of GROBeta and G-CSF, could release HSC from bone marrow more efficiently, with less pain. They found that the combination mobilized highly engraftable stem cells with a single injection and was generally well tolerated.[25] This next-generation strategy could increase the donor pool and thus expand the availability of HSC transplants for more patients with a variety of blood disorders. It also could provide a safer, less painful method to isolate a patient's own HSC for use in genetic therapies.

NHLBI's blood program also plays a major role in ensuring the Nation's blood supply is free of contaminants and infectious agents. The centerpiece of this effort is the Recipient Epidemiology and Donor Evaluation Study-III (REDS-III), which began in 1989 and was recently expanded to help prevent the transmission of Dengue and Zika viruses through blood transfusions. REDS-III was instrumental in developing Investigational New Drug applications that are now being used to test donated blood for the Zika virus.[26] The REDS-III program also has developed the Nation's largest database on blood transfusion, which is one of the most common medical procedures during hospitalization. The database combines recipient, blood component, and donor information from four major blood centers and 12 community and academic hospitals.[27] NHLBI also plans to hold a two-day workshop in September 2019 with the Department of Defense and academic centers to establish new clinical outcome guidelines for the use of hemostatic (blood clotting) products to treat injured soldiers.

Another active area of research for the blood program is looking at the interface between the circulatory system and the brain, known as the blood-brain barrier. This barrier protects the brain from toxic chemicals in the blood, but also can limit the entry of therapeutic drugs into the brain. NHLBI-funded researchers are making headway in understanding how movement across the blood-brain barrier is regulated, with the goal of selectively opening it up to neurologic therapies. For example, some recent studies focus on activated protein C, which has long been known to help prevent blood clots and is being studied as a potential target for stroke therapies. In a recent study, NHLBI-funded researchers discovered that the protein also has signaling functions and can act on cells within the blood-brain barrier to stabilize it.[28]

[25] www.ncbi.nlm.nih.gov/pubmed/29224778
[26] www.fda.gov/newsevents/newsroom/pressannouncements/ucm579313.htm
[27] www.ncbi.nlm.nih.gov/pubmed/29067705
[28] www.ncbi.nlm.nih.gov/pubmed/29866816

Budget Policy:
The FY 2020 President's Budget request is $384.7 million, a decrease of $62.2 million or 13.9 percent compared with the FY 2019 Enacted level.

Program Portrait: NHLBI Catalyze: Enhancing and Streamlining Support for Translational Research

FY 2019 Level: $5.1 million
FY 2020 Level: $4.3 million
Change: -$0.8 million

Translational science moves basic research findings into clinical trials that test interventions for safety and effectiveness before ultimately bringing them into the hands of clinicians and patients. However, navigating the transition from discoveries made in the lab to new medical products available to patients can be challenging, especially for academic researchers. Moreover, while NHLBI has established and maintained a variety of translational science programs over the years, these programs often have focused on specific diseases or scientific areas within the NHLBI mission, making it difficult for investigators working in many of the diverse fields within NHLBI's mission space to secure funding and resources to support their work.

NHLBI is launching the Catalyze program to address these challenges and empower investigators to conduct translational research. The three overarching goals of the program are (1) to drive development and safety testing of new potential therapies and cures including drugs, devices, and biologics (2) to support the creation of novel platform technologies to transform therapeutic development, and (3) to train a globally competitive biomedical workforce that is well-versed in scientific research, technology development, and entrepreneurship. Catalyze will offer a comprehensive suite of funding, technical services, training, and advisory services to translational investigators working across NHLBI's entire heart, lung, blood, and sleep portfolio. The program also relies heavily on partnerships across NIH, with other Federal health agencies, and with life science industry experts. NHLBI intends to build the Catalyze program in stages over the next several years, with FY 2020 funding focused on support for product development and transformative technology platforms.

Intramural Research: The intramural research program provides a unique environment for conducting innovative basic and clinical research at laboratories on the NIH campus, including studies at the NIH Clinical Center, often conducted in partnership with local hospitals. The program provides opportunities for scientists and trainees to work together toward a better understanding of molecular, cellular, and organ physiology, and ultimately the treatment of human diseases.

NHLBI's intramural program continues to be a leading scientific force in working towards improved treatments for sickle cell disease (SCD), a blood disorder caused by a mutation in the beta globin gene, which makes red blood cells take on a sickle shape that can block blood flow. Intramural researchers are conducting foundational work that is setting the stage for gene therapy interventions, a main component of the Cure Sickle Cell Initiative. As NHLBI investigators and other researchers around the country work to bring the most promising genetic therapies into first-in-human trials, NHLBI also will maintain its commitment to improving bone marrow transplantation for SCD, as well as developing other new treatments and cures.

Thousands of patients have received bone marrow from an immunologically matched sibling donor, with greater than 90 percent of patients cured since the first such transplant for SCD in 1984.[29] As NHLBI works to develop genetic therapies with the potential to work for all patients,

[29] www.ncbi.nlm.nih.gov/pubmed/27965196

one pressing question concerns the level of normal globin gene needed to cure SCD. In a recent study, NHLBI intramural researchers monitored 67 patients after bone marrow transplant to determine the level of HSC engraftment—and the level of globin gene correction—needed to cure SCD. They were able to establish that curing SCD requires restoration of the normal globin gene in at least 20 percent of a patient's blood cells.[30] Another pressing question concerns the best means to collect HSCs for autologous genetic therapy, which is when the cells are derived from patients, corrected to carry the normal globin gene, and re-implanted. A recent NHLBI study found that harvesting the cells directly from a needle inserted into the bone marrow does not produce optimal cells for sustained production of normal red blood cells. Intramural researchers also have reported in an earlier study that the drug most commonly used to induce HSC release from bone marrow is associated with a high risk of painful sickle cell crisis in patients with SCD.[31,32] Several research teams have built off of NHLBI intramural efforts[33] and recently found that the drug plerixafor can mobilize HSCs capable of forming red blood cells at a high dose and purity, and with a favorable safety profile, in patients with SCD.[34]

Intramural researchers also have been pioneers in developing new methods and tools forward to study the epigenome, the modifications to chromatin that can turn genes on or off in particular cells. A recent intramural study adds significantly to this body of research, by reporting a new technique to measure the positioning and spacing of genome-wide nucleosomes in single cells.[35] Nucleosomes are fundamental units that organize DNA to control the access of DNA-regulatory proteins, with the DNA wrapping around each nucleosome like thread wrapping around a spool. Understanding the organization of nucleosomes will yield much needed insights about how cells regulate genes. When applied to three different cell types, the new technique, called single-cell micrococcal nuclease sequencing (scMNase-seq), revealed that the position and spacing of nucleosomes display distinct patterns in association with active and silent genes within cells, and can prime cells to differentiate into certain cell types.

Budget Policy:
The FY 2020 President's Budget request is $189.1 million, a decrease of $30.5 million or 13.9 percent compared with the FY 2019 Enacted level.

Research Management and Support (RMS): RMS activities include administrative and technical functions that support and enhance the effectiveness of the Institute's research investments. This includes providing administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants and clinical trials, training awards, and research and development contracts. RMS functions also encompass strategic planning, trans-NHLBI and NIH coordination, evaluation of the Institute's programs, regulatory compliance,

[30] www.ncbi.nlm.nih.gov/pubmed/28887325
[31] www.ncbi.nlm.nih.gov/pubmed/19513902
[32] www.ncbi.nlm.nih.gov/pubmed/15536196
[33] www.ncbi.nlm.nih.gov/pubmed/21352197
[34] www.ncbi.nlm.nih.gov/pubmed/29712818
[35] www.ncbi.nlm.nih.gov/pubmed/30258225

international coordination, interactions with other Federal agencies and Congress, and dissemination of research findings to the public.

Budget Policy: The FY 2020 President's Budget request is $126.9 million, a decrease of $14.1 million or 10.0 percent compared with the FY 2019 Enacted level.

NATIONAL INSTITUTES OF HEALTH
National Heart, Lung, and Blood Institute

Budget Authority by Object Class[1]

(Dollars in Thousands)

		FY 2019 Enacted	FY 2020 President's Budget	FY 2020 +/- FY 2019
Total compensable workyears:				
	Full-time equivalent	962	962	0
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$186	$188	$2
	Average GM/GS grade	12.7	12.7	0.0
	Average GM/GS salary	$124	$124	$0
	Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	$0	$0	$0
	Average salary of ungraded positions	$0	$0	$0
	OBJECT CLASSES	**FY 2019 Enacted**	**FY 2020 President's Budget**	**FY 2020 +/- FY 2019**
	Personnel Compensation	—	—	—
11.1	Full-Time Permanent	66,180	66,432	251
11.3	Other Than Full-Time Permanent	35,203	35,337	134
11.5	Other Personnel Compensation	4,794	4,812	18
11.7	Military Personnel	2,077	2,146	70
11.8	Special Personnel Services Payments	10,042	10,080	38
11.9	**Subtotal Personnel Compensation**	**$118,296**	**$118,808**	**$511**
12.1	Civilian Personnel Benefits	34,900	35,560	660
12.2	Military Personnel Benefits	1,187	1,227	40
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$154,383**	**$155,594**	**$1,211**
21.0	Travel & Transportation of Persons	3,389	3,387	-2

22.0	Transportation of Things	376	376	0
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Others	0	0	0
23.3	Communications, Utilities & Misc. Charges	1,057	486	-570
24.0	Printing & Reproduction	12	12	0
25.1	Consulting Services	688	679	-9
25.2	Other Services	83,697	60,313	-23,384
25.3	Purchase of goods and services from government accounts	239,875	202,771	-37,104
25.4	Operation & Maintenance of Facilities	643	643	0
25.5	R&D Contracts	144,805	114,903	-29,902
25.6	Medical Care	977	977	0
25.7	Operation & Maintenance of Equipment	27,062	24,386	-2,676
25.8	Subsistence & Support of Persons	4	4	0
25.0	**Subtotal Other Contractual Services**	**$497,752**	**$404,677**	**-$93,075**
26.0	Supplies & Materials	16,294	8,070	-8,223
31.0	Equipment	9,312	7,854	-1,458
32.0	Land and Structures	0	0	0
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	2,805,759	2,422,239	-383,520
42.0	Insurance Claims & Indemnities	0	0	0
43.0	Interest & Dividends	2	2	0
44.0	Refunds	0	0	0
	Subtotal Non-Pay Costs	**$3,333,952**	**$2,847,102**	**-$486,850**
	Total Budget Authority by Object Class	**$3,488,335**	**$3,002,696**	**-$485,639**

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

NATIONAL INSTITUTES OF HEALTH
National Heart, Lung, and Blood Institute

Salaries and Expenses

(Dollars in Thousands)

OBJECT CLASSES	FY 2019 Enacted	FY 2020 President's Budget	FY 2020 +/- FY 2019
Personnel Compensation	-	-	-
Full-Time Permanent (11.1)	$66,180	$66,432	$251
Other Than Full-Time Permanent (11.3)	35,203	35,337	134
Other Personnel Compensation (11.5)	4,794	4,812	18
Military Personnel (11.7)	2,077	2,146	70
Special Personnel Services Payments (11.8)	10,042	10,080	38
Subtotal Personnel Compensation (11.9)	**$118,296**	**$118,808**	**$511**
Civilian Personnel Benefits (12.1)	$34,900	$35,560	$660
Military Personnel Benefits (12.2)	1,187	1,227	40
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$154,383**	**$155,594**	**$1,211**
Travel & Transportation of Persons (21.0)	$3,389	$3,387	-$2
Transportation of Things (22.0)	376	376	0
Rental Payments to Others (23.2)	0	0	0
Communications, Utilities & Misc. Charges (23.3)	1,057	486	-570
Printing & Reproduction (24.0)	12	12	0
Other Contractual Services:	-	-	-
Consultant Services (25.1)	688	679	-9
Other Services (25.2)	83,697	60,313	-23,384
Purchases from government accounts (25.3)	239,875	202,771	-37,104
Operation & Maintenance of Facilities (25.4)	643	643	0
Operation & Maintenance of Equipment (25.7)	27,062	24,386	-2,676
Subsistence & Support of Persons (25.8)	4	4	0
Subtotal Other Contractual Services	**$351,969**	**$288,796**	**-$63,173**
Supplies & Materials (26.0)	$16,294	$8,070	-$8,223
Subtotal Non-Pay Costs	**$373,096**	**$301,127**	**-$71,969**
Total Administrative Costs	**$527,480**	**$456,721**	**-$70,758**

Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2018 Final			FY 2019 Enacted			FY 2020 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Center for Translation Research and Implementation Science	–	–	–	–	–	–	–	–	–
Direct:	14	2	16	16	2	18	16	2	18
Reimbursable:	–	–	–	–	–	–	–	–	–
Total:	14	2	16	16	2	18	16	2	18
Division of Blood and Resources	–	–	–	–	–	–	–	–	–
Direct:	29	1	30	32	1	33	32	1	33
Reimbursable:	–	–	–	–	–	–	–	–	–
Total:	29	1	30	32	1	33	32	1	33
Division of Cardiovascular Sciences	–	–	–	–	–	–	–	–	–
Direct:	119	2	121	124	6	130	124	6	130
Reimbursable:	–	–	–	–	–	–	–	–	–
Total:	119	2	121	124	6	130	124	6	130
Division of Extramural Research Activities	–	–	–	–	–	–	–	–	–
Direct:	93	–	93	99	–	99	99	–	99
Reimbursable:	–	–	–	–	–	–	–	–	–
Total:	93	–	93	99	–	99	99	–	99
Division of Intramural Research	–	–	–	–	–	–	–	–	–
Direct:	403	14	417	439	9	448	439	9	448
Reimbursable:	38	1	39	38	1	39	38	1	39
Total:	441	15	456	477	10	487	477	10	487
Division of Lung Diseases	–	–	–	–	–	–	–	–	–
Direct:	33	–	33	36	–	36	36	–	36
Reimbursable:	–	–	–	–	–	–	–	–	–
Total:	33	–	33	36	–	36	36	–	36
Office of the Director	–	–	–	–	–	–	–	–	–
Direct:	125	3	128	133	2	135	133	2	135
Reimbursable:	23	1	24	24	–	24	24	–	24
Total:	148	4	152	157	2	159	157	2	159
Total	877	24	901	941	21	962	941	21	962
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0

FISCAL YEAR	Average GS Grade
2016	12.5
2017	12.6
2018	12.7
2019	12.7
2020	12.7

Detail of Positions[1]

GRADE	FY 2018 Final	FY 2019 Enacted	FY 2020 President's Budget
Total, ES Positions	2	2	2
Total, ES Salary	$365,651	$372,781	$375,994
GM/GS-15	90	80	80
GM/GS-14	148	149	149
GM/GS-13	200	255	255
GS-12	64	73	73
GS-11	43	50	50
GS-10	0	0	0
GS-9	36	36	36
GS-8	7	8	8
GS-7	7	4	4
GS-6	1	2	2
GS-5	1	2	2
GS-4	9	8	8
GS-3	5	4	4
GS-2	1	0	0
GS-1	1	2	2
Subtotal	**613**	**673**	**673**
Grades established by Act of July 1, 1944 (42 U.S.C. 207)			
Assistant Surgeon General	1	1	1
Director Grade	7	7	7
Senior Grade	7	7	7
Full Grade	6	6	6
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	**21**	**21**	**21**
Ungraded	266	266	266
Total permanent positions	635	635	635
Total positions, end of year	902	0	0
Total full-time equivalent (FTE) employment, end of year	901	962	962
Average ES salary	$182,826	190,025	190,025
Average GM/GS grade	12.6		
Average GM/GS salary	$118,820	$123,500	123,500

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