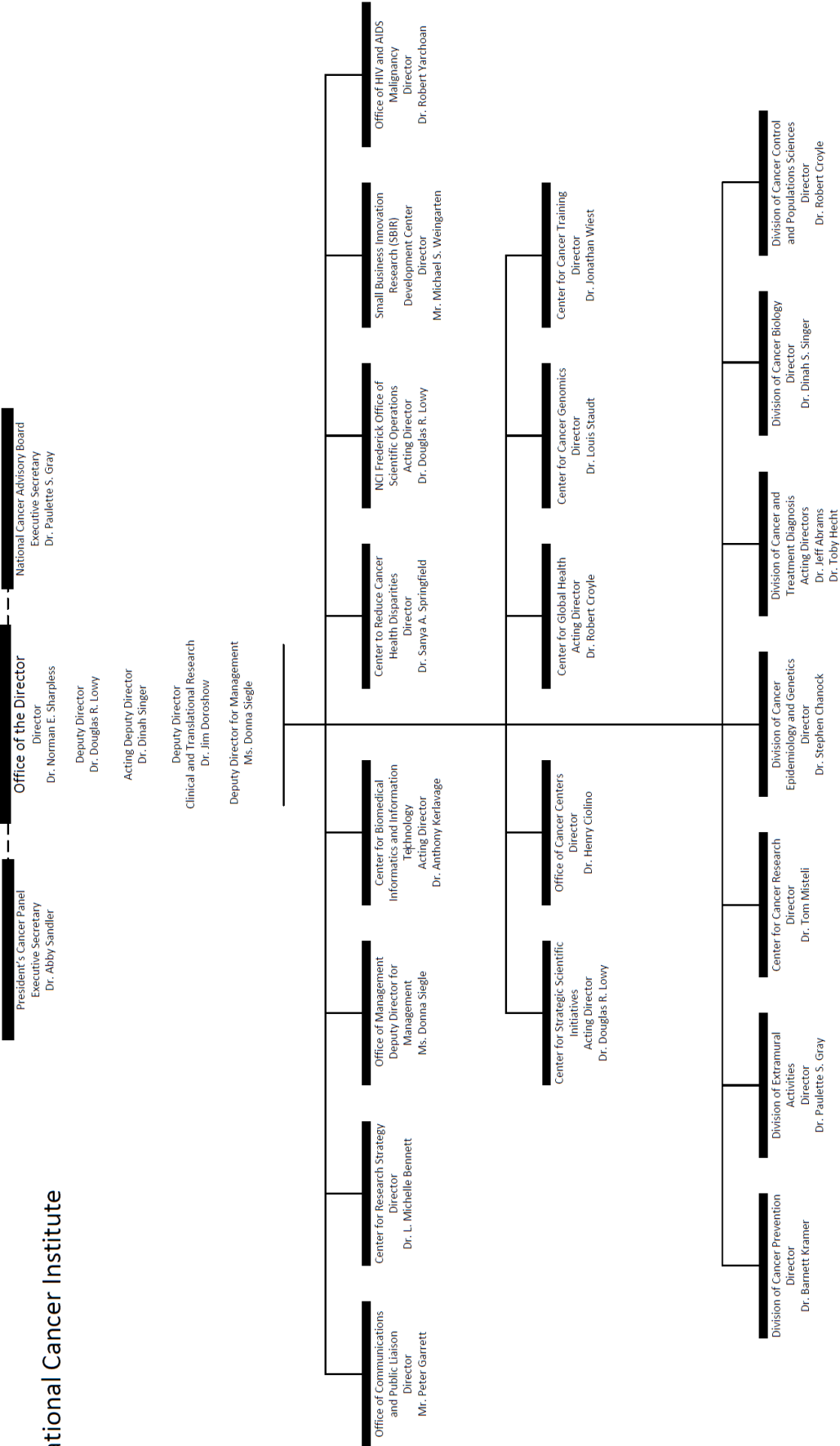


DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
National Cancer Institute (NCI)

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National Cancer Institute



NATIONAL INSTITUTES OF HEALTH

NATIONAL CANCER INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to cancer, [5,743,892,000]5,051,737,000, of which up to \$30,000,000 may be used for facilities repairs and improvements at the National Cancer Institute—Frederick Federally Funded Research and Development Center in Frederick, Maryland.

NIH INNOVATION ACCOUNT, CURES ACT (INCLUDING TRANSFER OF FUNDS)

For necessary expenses to carry out the purposes described in section 1001(b)(4) of the 21st Century Cures Act, in addition to amounts available for such purposes in the appropriations provided to the NIH in this Act, [711,000,000]492,000,000, to remain available until expended: *Provided*, That such amounts are appropriated pursuant to section 1001(b)(3) of such Act, are to be derived from amounts transferred under section 1001(b)(2)(A) of such Act, and may be transferred by the Director of the National Institutes of Health to other accounts of the National Institutes of Health solely for the purposes provided in such Act: *Provided further*, That upon a determination by the Director that funds transferred pursuant to the previous proviso are not necessary for the purposes provided, such amounts may be transferred back to the Account: *Provided further*, That the transfer authority provided under this heading is in addition to any other transfer authority provided by law.

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Amounts Available for Obligation¹
(Dollars in Thousands)

Source of Funding	FY 2018 Final	FY 2019 Enacted	FY 2020 President's Budget
Appropriation ^{2,3}	\$5,964,800	\$6,143,892	\$5,246,737
Mandatory Appropriation: (non-add)			
<i>Type 1 Diabetes</i>	(0)	(0)	(0)
<i>Other Mandatory financing</i>	(0)	(0)	(0)
Rescission	0	0	0
Sequestration	0	0	0
Secretary's Transfer	-13,309	0	0
Subtotal, adjusted appropriation	\$5,951,491	\$6,143,892	\$5,246,737
OAR HIV/AIDS Transfers	-7,785	0	0
Subtotal, adjusted budget authority	\$5,943,706	\$6,143,892	\$5,246,737
Unobligated balance, start of year ⁴	0	15,727	0
Unobligated balance, end of year ⁴	-15,727	0	0
Subtotal, adjusted budget authority	\$5,927,979	\$6,159,619	\$5,246,737
Unobligated balance lapsing	-250	0	0
Total obligations	\$5,927,729	\$6,159,619	\$5,246,737

¹ Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:

FY 2018 - \$19,873 FY 2019 - \$20,370 FY 2020 - \$20,429

² Of which \$300.0 million in FY 2018, \$400.0 million in FY 2019, and \$195.0 million in FY 2020 is derived by transfer from the NIH Innovation Account under the 21st Century Cures Act

³ Of which \$50.0 million is included for the new Pediatric Cancer Research Initiative in FY 2020

⁴ Reflects 21st Century Cures Act Funding not obligated in FY 2018, and carried over into FY 2019

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Budget Mechanism - Total¹
(Dollars in Thousands)

MECHANISM	FY 2018 Final		FY 2019 Enacted ²		FY 2020 President's Budget ³		FY 2020 +/- FY 2019	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
<u>Research Projects:</u>								
Noncompeting	3,338	\$1,699,682	3,595	\$1,871,597	3,266	\$1,710,823	-329	-\$160,775
Administrative Supplements	(280)	36,754	(212)	29,220	(161)	22,811	(-51)	-6,408
Competing:								
Renewal	98	65,957	99	66,246	101	58,919	2	-7,327
New	1,062	504,934	1,087	555,362	1,167	445,786	80	-109,576
Supplements	2	331	2	332	2	396	0	63
Subtotal, Competing	1,162	\$571,222	1,188	\$621,940	1,270	\$505,100	82	-\$116,840
Subtotal, RPGs	4,500	\$2,307,659	4,783	\$2,522,757	4,536	\$2,238,734	-247	-\$284,023
SBIR/STTR	280	142,899	282	144,267	242	124,169	-40	-20,098
Research Project Grants	4,780	\$2,450,558	5,065	\$2,667,024	4,778	\$2,362,903	-287	-\$304,121
<u>Research Centers:</u>								
Specialized/Comprehensive	238	\$625,500	245	\$675,035	199	\$487,778	-46	-\$187,257
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	75	0	75	0	64	0	-11
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	238	\$625,575	245	\$675,110	199	\$487,842	-46	-\$187,268
<u>Other Research:</u>								
Research Careers	432	\$78,338	370	\$80,444	352	\$76,422	-18	-\$4,022
Cancer Education	76	21,182	85	24,857	81	23,614	-4	-1,243
Cooperative Clinical Research	48	255,341	104	277,877	92	244,863	-12	-33,014
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	98	0	196	0	167	0	-28
Other	239	182,908	174	102,457	178	104,634	4	2,177
Other Research	795	\$537,866	733	\$485,831	703	\$449,700	-30	-\$36,130
Total Research Grants	5,813	\$3,613,999	6,043	\$3,827,964	5,680	\$3,300,445	-363	-\$527,519
<u>Ruth L Kirchstein Training Awards:</u>	<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>	
Individual Awards	525	\$23,148	559	\$24,876	524	\$23,633	-35	-\$1,244
Institutional Awards	1,007	59,265	1,076	64,437	1,011	61,215	-65	-3,222
Total Research Training	1,532	\$82,413	1,635	\$89,313	1,535	\$84,847	-100	-\$4,466
Research & Develop. Contracts (SBIR/STTR) (non-add)	402 (45)	\$841,383 (24,364)	343 (36)	\$787,636 (26,368)	260 (33)	\$596,202 (25,136)	-83 (-3)	-\$191,434 (-1,232)
Intramural Research	1,709	945,496	1,757	960,626	1,757	857,358	0	-103,268
Res. Management & Support Res. Management & Support (SBIR Admin) (non-add)	1,243 (0)	442,415 (0)	1,278 (0)	460,353 (2,400)	1,278 (0)	393,885 (0)	0 (0)	-66,469 (-2,400)
Construction		0		0		0		0
Buildings and Facilities		18,000		18,000		14,000		-4,000
Total, NCI	2,952	\$5,943,706	3,035	\$6,143,892	3,035	\$5,246,737	0	-\$897,155

¹ Of which \$300.0 million in FY 2018, \$400.0 million in FY 2019, and \$195.0 million in FY 2020 is derived by transfer from the NIH Innovation Account under the 21st Century Cures Act

² Includes \$15.7 million of 21st Century Cures Act funding not obligated in FY 2018, and carried over into FY 2019

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

Major changes by budget mechanism or budget activity are briefly described below. Note that there may be overlap between budget mechanisms and activity detail, and the highlights on this page will not sum to the total change for the FY 2020 President's Budget for NCI, which is \$897.2 million less than the FY 2019 Enacted level, for a total of \$5,246.7 million, a decrease of 14.6 percent. This level includes \$50.0 million for a new Pediatric Cancer Research Initiative and \$195.0 million to support the ongoing 21st Century Cures Act Cancer MoonshotSM efforts. The FY 2020 President's Budget reflects the Administration's fiscal policy goals for the Federal Government. Within that framework, NCI will pursue its highest research priorities through strategic investments and careful stewardship of appropriated funds. Reductions will occur in nearly every budget mechanism; however, strategic prioritization, the new Pediatric Cancer Research Initiative, and funding plans for the Cancer MoonshotSM will lessen reductions to some program areas. The 21st Century Cures Act funding will continue to support Cancer MoonshotSM projects that implement the Blue Ribbon Panel recommendations. This budget reflects NCI's plans to address fluctuating 21st Century Cures Act funding levels resulting in fewer new Cancer MoonshotSM initiatives beginning in FY 2020.

Research Project Grants (-\$304.1 million; total \$2,362.9 million): During FY 2020, NCI will issue new competing Research Project Grants (RPGs) and support the NCI commitment base for non-competing RPGs at reduced levels, consistent with the overall budget request. Funding for RPGs will decline by 11.4 percent compared to the FY 2019 Enacted level. For noncompeting grants, NCI will continue to honor grants awarded in previous years that remain active in FY 2020. Funding for noncompeting RPGs will decline by 8.6 percent compared to the FY 2019 Enacted level. NCI funding for competing RPGs will decline by 18.8 percent compared to the FY 2019 Enacted level. Due to an anticipated average cost reduction of 26.5 percent for competing RPGs, NCI estimates that it will issue 1,270 competing RPG awards, 82 more than in FY 2019.

NCI intends to give priority to competing and noncompeting awards issued to new and early stage investigators and thereby support cancer research conducted by early career scientists who are poised to become future leaders. Grant awards to these investigators will also experience reductions, but at a lesser rate compared to other grant types. NCI will support SBIR/STTR awards at levels consistent with the statutory formula for FY 2020.

Research Centers (-\$187.3 million; total \$487.8 million): Within the Research Centers budget mechanism, the overall funding reduction will be 27.7 percent. This will result in a significant contraction of the NCI-designated Cancer Centers program and Specialized Programs of Research Excellence (SPOREs) program, although reductions to individual research centers will not be at a single, uniform level.

Other Research (-\$36.1 million; total \$449.7 million): Within the Other Research budget mechanism, the overall funding reduction will be 7.4 percent. However, NCI made the strategic decision to minimize reductions to education and training within this mechanism. Given these priorities, other programs within this budget mechanism will experience reductions that exceed 7.4 percent.

Historically, more than 30,000 patients are annually enrolled in large-scale treatment trials through participating institutes that collaborate in the Cooperative Clinical Research Program. For this reason, NCI considers the Cooperative Clinical Research Program to be a high value to cancer science and a priority for FY 2020.

Similarly, NCI made the strategic decision to prioritize funding related to education and training. This includes funding for the Cancer Research Education Grants program which supports activities that enhance workforce training to meet the nation's research needs. In addition, NCI will maintain the funding level of the Career Development Awards program which supports early-career scientists and clinicians to develop independent careers in cancer research.

Research & Development Contracts (-\$191.4 million; total \$596.2 million): During FY 2020, NCI will reduce research contracts by 24.3 percent. R&D contracts support cancer discovery in many ways, but the FY 2020 budget environment requires NCI to reduce its contract profile to ensure that funding is available for other cancer research priorities.

Intramural Research (-\$103.3 million; total \$857.4 million): During FY 2020, NCI will reduce intramural cancer research by 10.8 percent. Intramural science remains an important priority within the overall NCI cancer research portfolio, but NCI must reduce the scope of its Intramural Research Program in the current budget environment. As in the past, NCI intramural research will emphasize high-risk, high-reward cancer research that would otherwise not be conducted by other entities.

Training Awards (-\$4.5 million; total \$84.8 million): During FY 2020, NCI will reduce research training awards by 5.0 percent. Programs to train and retain a diverse workforce of researchers with the skills required to conduct demanding and sophisticated cancer research will remain a high priority for NCI. NCI training programs help maintain a strong cadre of future researchers capable of delivering important research results for the patients we serve. During FY 2020, NCI will prioritize support for training mechanisms that emphasize progress towards research independence.

Buildings and Facilities (-\$4.0 million; total \$14.0 million): The NCI Federally Funded Research and Development Center in Frederick has many buildings that are over 50 years old. During FY 2020, NCI will use these funds to replace aging building infrastructure, modify laboratories to install new state-of-the-art research instrumentation and equipment, reconfigure laboratory space to support emerging cancer research needs, and provide new infrastructure to protect mission-critical operations of the Frederick National Laboratory for Cancer Research. At the decreased funding level, NCI will move forward with the highest priority infrastructure and modernization projects.

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Summary of Changes
(Dollars in Thousands)

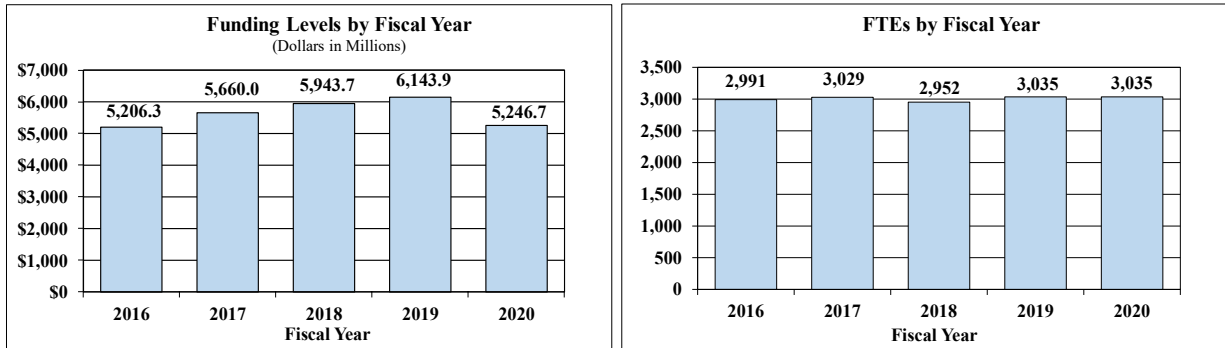
FY 2019 Enacted	\$6,143,892
FY 2020 President's Budget	\$5,246,737
Net change	-\$897,155

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	\$338,502	\$0
b. January FY 2020 pay increase & benefits	338,502	\$1,464
c. Paid days adjustment	338,502	997
d. Differences attributable to change in FTE	338,502	0
e. Payment for centrally furnished services	136,358	-15,151
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs	382,499	3,825
Subtotal		-\$8,865
2. Research Management and Support:		
a. Annualization of January 2019 pay increase & benefits	\$220,535	\$0
b. January FY 2020 pay increase & benefits	220,535	1,009
c. Paid days adjustment	220,535	639
d. Differences attributable to change in FTE	220,535	0
e. Payment for centrally furnished services	31,222	-3,470
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs	142,128	1,421
Subtotal		-\$400
Subtotal, Built-in		-\$9,265

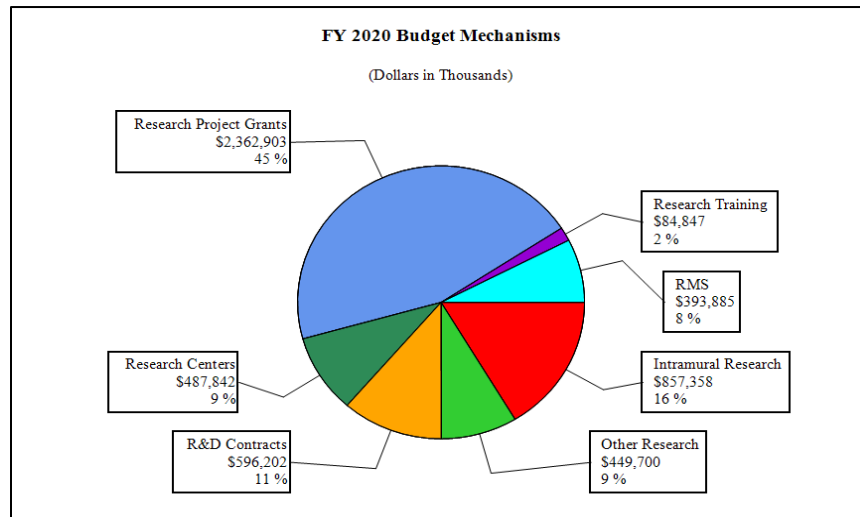
CHANGES	FY 2020 President's Budget		Change from FY 2019 Enacted	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	3,266	\$1,733,634	-329	-\$167,183
b. Competing	1,270	505,100	82	-116,840
c. SBIR/STTR	242	124,169	-40	-20,098
Subtotal, RPGs	4,778	\$2,362,903	-287	-\$304,121
2. Research Centers	199	\$487,842	-46	-\$187,268
3. Other Research	703	449,700	-30	-36,130
4. Research Training	1,535	84,847	-100	-4,466
5. Research and development contracts	260	596,202	-83	-191,434
Subtotal, Extramural		\$3,981,494		-\$723,419
6. Intramural Research	1,757	\$857,358	0	-\$94,403
7. Research Management and Support	1,278	393,885	0	-66,069
8. Construction		0		0
9. Buildings and Facilities		14,000		-4,000
Subtotal, Program	3,035	\$5,246,737	0	-\$727,419
Total changes				-\$897,155

Fiscal Year 2020 Budget Graphs

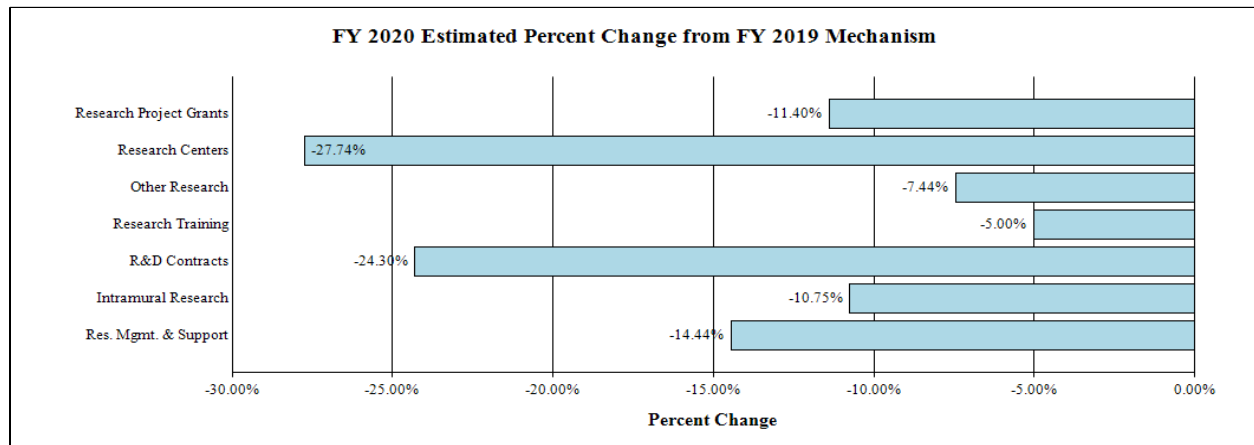
History of Budget Authority and FTEs:



Distribution by Mechanism:



Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Budget Authority by Activity
(Dollars in Thousands)

	FY 2018 Final		FY 2019 Enacted		FY 2020 President's Budget		FY 2020 +/- FY 2019	
	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount
Extramural Research								
<u>Detail</u>								
Understanding How Cancer Develops		\$823,816		\$848,348		\$717,472		-\$130,876
Understanding the Causes of Cancer		986,346		1,013,530		862,636		-150,895
Detecting and Diagnosing Cancer		577,922		598,358		497,989		-100,369
Treating Cancer and Improving Survivorship		1,123,670		1,151,724		987,553		-164,172
Improving Cancer Prevention and Control		218,456		223,228		193,120		-30,108
Cancer Centers		625,575		675,110		487,842		-187,268
Research Workforce Development		182,011		194,614		184,883		-9,731
Buildings and Facilities		18,000		18,000		14,000		-4,000
Pediatric Cancer Research Initiative						50,000		50,000
Subtotal, Extramural		\$4,555,795		\$4,722,913		\$3,995,494		-\$727,419
Intramural Research	1,709	\$945,496	1,757	\$960,626	1,757	\$857,358	0	-\$103,268
Research Management & Support	1,243	\$442,415	1,278	\$460,353	1,278	\$393,885	0	-\$66,469
TOTAL	2,952	\$5,943,706	3,035	\$6,143,892	3,035	\$5,246,737	0	-\$897,155

**NATIONAL INSTITUTES OF HEALTH
National Cancer 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		Indefinite	
National Cancer Institute	Section 401(a)	42§281	Indefinite	\$6,143,892,000	Indefinite	\$5,246,737,000
Total, Budget Authority				\$6,143,892,000		\$5,246,737,000

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Appropriations History¹

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2011	\$5,264,643,000		\$5,256,409,000	\$5,103,388,000
Rescission				\$44,810,787
2012	\$5,196,136,000	\$5,196,136,000	\$5,001,623,000	\$5,081,788,000
Rescission				\$9,604,579
2013	\$5,068,864,000		\$5,084,227,000	\$5,072,183,421
Rescission				\$10,144,367
Sequestration				(\$254,588,730)
2014	\$5,125,951,000		\$5,091,885,000	\$4,923,238,000
Rescission				\$0
2015	\$4,930,715,000			\$4,950,396,000
Rescission				\$0
2016	\$5,098,479,000	\$5,081,812,000	\$5,204,058,000	\$5,214,701,000
Rescission				\$0
2017 ²	\$5,893,509,000	\$5,388,444,000	\$5,429,769,000	\$5,689,329,000
Rescission				\$0
2018	\$4,474,222,000	\$5,771,181,000	\$5,858,270,000	\$5,964,800,000
Rescission				\$0
2019	\$5,626,312,000	\$6,136,037,000	\$6,147,125,000	\$6,143,892,000
Rescission				\$0
2020	\$5,246,737,000			

¹ Includes funds derived by transfer from the NIH Innovation Account under the 21st Century Cures Act

² Budget Estimate to Congress includes mandatory financing

FY 2020 Justification of Budget Request

National Cancer 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	\$5,943,706,000	\$6,143,892,000	\$5,246,737,000	-\$897,155,000
FTE	2,952	3,035	3,035	0

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

NCI Director's Overview

This is a time of dramatic progress and remarkable opportunity in cancer research. Thanks to expanding knowledge about how cancers arise and armed with the advanced research tools of genomics and data science, NCI and its many extramural partners are poised to accelerate progress on preventing, diagnosing, and treating cancer. The President's Budget for FY 2020 will allow NCI to build on the achievements we are witnessing across the field of cancer research and improve outcomes for patients with all types of cancer.

An important element of the FY 2020 request is an additional \$50.0 million investment above the FY 2019 level to address childhood cancer, which was announced by the President in the 2019 State of the Union Address. This investment, when maintained each year, would be \$500 million over ten years. The science of understanding pediatric cancer is especially challenging, and too many children and adolescents die from their disease. Many others endure lifelong adverse effects from their cancers or from toxicities due to their treatment. While the progress in treating some childhood cancers has been encouraging, for many other cancers it has been disappointing.

The initiative will support research to develop new, more effective, and safer treatments for childhood cancers, complementing ongoing NCI research in the NCI portfolio. To achieve these objectives, NCI will aggregate data from pediatric cancer cases and coordinate with others that maintain data sets on pediatric patients to create a federated, comprehensive, and shared resource to support childhood cancer research in all its forms.

Transformational Tools and Technologies

Many examples illustrate the breadth and pace of cancer progress, but foremost among these are recent immunotherapy advances. Immunotherapy, activating a patient's immune system to attack their cancer, is a vast new frontier in cancer treatment. This era began in 2011 with approval by the Food and Drug Administration (FDA) of antibodies blocking CTLA4 as therapy for metastatic melanoma. In March 2013, immunotherapy reached a milestone when the FDA announced plans to give expedited review to the first of a new generation of cancer immunotherapies.

Since then, we have seen rapid expansion of this field, with thousands of patients entering hundreds of immunotherapy trials leading to approval of more than 10 types of immunotherapy, including CAR-T cells, the first genetically engineered cellular therapy for any disease. Today, highly active immunotherapies with curative potential are approved in many types of cancer including those of the skin, lung, bladder, colon, kidney, and several other tissues.

The editors of *Science* Magazine declared cancer immunotherapy the scientific “Breakthrough of the Year” in 2013 and in 2018, Drs. James Allison and Tasuku Honjo received the Nobel Prize in Physiology or Medicine for their immunotherapy research. Also, in 2018, NCI intramural scientist Dr. Steven Rosenberg and a cadre of other NCI-supported researchers, including Drs. James Allison and Carl June, received accolades and were awarded the Albany Medical Center Prize in Medicine and Biomedical Research based on groundbreaking immunology research. Immunotherapy is among the most promising opportunities in cancer science and has become standard therapy for many cancers. NCI is committed to expanding recent successes in cancer immunotherapy to benefit patients with a much wider range of tumor types.

Building on Basic Science

Other noteworthy advances include:

- Results from a trial known as TAILORx, the Trial Assigning Individualized Options for Treatment (Rx), showed that women with a common type of early-stage breast cancer do not benefit from adding chemotherapy to their treatment. The knowledge gained from this trial means that most women diagnosed in the early stages of this common breast cancer can be spared the short- and long-term effects of chemotherapy.
- Following years of basic and translational research conducted by NCI’s intramural program, in September 2018, the FDA approved a new drug (moxetumomab) for patients with advanced hairy cell leukemia (HCL). This marks the first new therapy for HCL in more than 20 years.
- Another important advance for treating leukemia emerged from two NCI-supported clinical trials, and the discovery that combining two drugs (ibrutinib and rituximab) was superior to the standard treatment for many patients with chronic lymphocytic leukemia (CLL). This discovery may revolutionize care of patients with CLL.
- With leadership from NCI’s intramural program, an international team identified the genetic subtypes of a form of lymphoma, diffuse large B-cell lymphoma. This knowledge offers new opportunities to develop treatments for patients with this cancer.

Exploring the Next Frontier

NCI also recognizes the importance of research and technology advances by small biotech firms to further our cancer mission. An FY 2018 analysis documented the contributions of NCI’s Small Business Innovation Research investment to technologies commercialized from Phase II grants awarded to small businesses between 1998 and 2010. Among 690 Phase II grants, 247 products have entered clinical practice, are providing new options for cancer care, and are benefiting cancer patients. NCI is excited about the continued role this program plays in the development of new approaches to diagnose and treat cancer.

As our accomplishments demonstrate, NCI, the cancer research community, and cancer patients are fortunate to have enlightened leadership and sustained commitment from Congress over

many years. The scope of cancer progress is best measured by the results we achieved; cancer death rates declined 26.0 percent since 1991. NCI research, thanks to consistent support from Congress, yielded important advances and a steady decline in cancer mortality.

Yet, despite progress in preventing, diagnosing, and treating cancers, too many Americans face a cancer diagnosis, and far too many die from the disease. In the coming year, more than 1.7 million new cases of cancer will be diagnosed in the United States and more than 600,000 patients will die from cancer. During their lifetimes, more than one-third of our nation will be diagnosed with cancer. Despite overall progress, mortality rates for certain cancers have increased, while cancer health disparities, the differences in the burden of cancer incidence, prevalence, treatment response, and mortality, remain a serious public health challenge.

Thus, much work remains to meet the needs of those suffering from cancer, those at risk of cancer, and the growing population of cancer survivors. The resources in this budget will allow NCI to conduct our mission in ways that deliver important results for the patients we serve.

Overall Budget Policy:

The FY 2020 President's Budget request is \$5,246.7 million, a decrease of \$897.2 million, or 14.6 percent, compared with the FY 2019 Enacted level. The Budget includes \$50.0 million for the Pediatric Cancer Research Initiative and \$195.0 million to support the ongoing 21st Century Cures Act Cancer Moonshot efforts. For FY 2020, NCI made strategic choices that prioritize how it allocates funding to NCI research programs. For example, NCI will prioritize research training programs during FY 2020.

FY 2020 NCI Program Descriptions and Accomplishments

NCI conducts basic and applied research that advances five broad scientific goals:

- Understanding How Cancer Develops
- Understanding the Causes of Cancer
- Detecting and Diagnosing Cancer
- Treating Cancer and Improving Survivorship
- Improving Cancer Prevention and Control

To pursue these goals, NCI issues grants to support investigator-initiated research, conducts clinical trials, and finances a range of other research programs. NCI selects and supports NCI-designated Cancer Centers, conducts basic, clinical, and population research through its intramural program, manages research contracts, including a Federally Funded Research and Development Center (FFRDC) for operations of the Frederick National Laboratory for Cancer Research, and operates research facilities to support NCI intramural and FFRDC activities.

NCI uses these and other mechanisms to support research and advance NCI scientific goals. Investigator-initiated research project grants constitute a large portion of the research investment for all five goals. During FY 2018, NCI issued 5,813 grant awards across all grant mechanisms, including 3,028 traditional research project (R01) and 302 exploratory (R21) grants. These grant awards include 14 grants through the 21st Century Cures Act.

The FY 2018 total for grant awards also includes 20 Outstanding Investigator (R35) Awards (OIA), which provide seven years of funding to investigators with outstanding records in cancer research. OIA grants are an opportunity for researchers to test high-risk hypotheses supported by

a higher award level and for more years than under a traditional research project grant. In the four years since NCI began the OIA program, NCI has issued 127 competing OIAs. NCI also has a long-standing priority of developing and supporting the next generation of talented cancer researchers. Our goal is to maintain a robust pipeline of scientists who can provide future leadership in basic, translational, and clinical research. An important component of this priority is supporting researchers early in their careers. Early Stage Investigators (ESIs) are researchers who completed a terminal research degree or medical residency within the past 10 years and have not previously competed successfully for a substantial NIH research grant. During FY 2018, NCI exceeded its goal of a 25.0 percent increase in these awards.

NCI is also identifying ways to enhance the research environment for ESIs. This includes reducing the administrative burden of grant applications to ensure that young scientists do not become discouraged and leave to pursue other careers. During FY 2018, NCI enhanced an existing grant mechanism, the Method to Extend Research in Time (MERIT) R37 Award by extending the length of time that ESIs can receive funding under their first substantial independent grant. Using this approach, NCI can convert the most meritorious ESI applications to R37 grants, which will provide a sixth and seventh year of support for these investigators.

During FY 2018, more than 30,000 new patients enrolled in clinical trials that NCI sponsored or supported. Two-thirds of these patients enrolled in trials supported through the National Clinical Trials Network (NCTN) and the NCI Community Oncology Research Network (NCORP).

The NCI FY 2020 Budget includes a \$50.0 million initiative on childhood cancer. The initiative is an opportunity to develop new, more effective, safer treatments for childhood cancers, and will supplement ongoing research in the NCI portfolio. Through this initiative, NCI will aggregate data from pediatric cancer cases and coordinate with partners that maintain similar data sets to create a federated, comprehensive, and shared resource to support childhood cancer research.

The narratives that follow highlight some of NCI's programs and identify recent progress as well as ongoing and future activities in each scientific area. However, it is important to appreciate that virtually all NCI research under one scientific goal influences the approaches used to advance goals in the other scientific areas. The breadth and complexity of NCI research precludes a complete review of all NCI programs in this budget document. Further details appear on the NCI web site, www.cancer.gov. The examples that follow offer a meaningful overview of NCI accomplishments and initiatives but understate the vast amount of valuable NCI work to advance the National Cancer Program.

I. Understanding How Cancer Develops

Cancer is driven by alterations of a cell's genome (DNA) and the proteins that its DNA encodes. During this process, abnormal types and amounts of proteins emerge that lead to a variety of molecular abnormalities. These abnormalities cause a normal cell to transform into a tumor cell and lead to a diminished ability to control growth and other hallmarks of cancer. Precision medicine, in all its forms, depends on a deeper understanding of the genetic and functional changes that occur in cancer cells and the tumor microenvironment.

To better understand how cancer develops, NCI supports large-scale, high-throughput studies of the genes, proteins, and pathways altered in cancer. In addition, NCI funds studies of basic cell biology, cell interactions, angiogenesis, the formation of blood vessels supporting a tumor, immune responses, and other essential research to understand the mechanisms of cancer

development. NCI also supports laboratory studies in a variety of model systems, including animal and computational models, to investigate the functions of these systems and their relationship to cancer.

Budget Policy:

The FY 2020 President's Budget request is \$717.5 million, a decrease of \$130.9 million, or 15.4 percent, compared with the FY 2019 Enacted level.

Examples of initiatives under this NCI research goal include:

New-Onset Diabetes and Risk of Pancreatic Cancer: Within the NCI Community Oncology Research Program (NCORP), NCI is collaborating with the Pancreatic Cancer Action Network to assemble a cohort of new-onset diabetes patients to estimate the probability that they may develop pancreatic ductal adenocarcinoma (PDAC).

Reducing Cancer Disparities: Certain groups suffer disproportionately from higher incidence and mortality rates for some cancers compared to the general population. NCI strives to understand the causes of these disparities and to reduce them. For example, NCI is supporting two major research studies addressing cancer disparities in African American populations.

The Microbiome and Controlling Antitumor Immune Function in Liver: Scientists in NCI's intramural program found that bacteria present in the gut of mice affect the liver's antitumor immune function. Treating mice with antibiotics and depleting certain bacteria can change the composition of immune cells, affecting tumor growth in the liver.

II. Understanding the Causes of Cancer

Cancer develops through a complex interplay of genetics, lifestyle decisions, environmental factors, and changes that occur through aging. These factors probably influence the likelihood of developing almost all cancers. In some cases, cancer risk is more strongly influenced by inheriting a mutation or a variant of a gene or a combination of genes. In other cases, cancer risk is determined principally by external factors, such as exposure to tobacco or infectious agents.

Understanding the interactions among genetic background, environmental, and lifestyle factors will improve the ability of scientists to prevent as well as detect, diagnose, and treat cancers at the earliest possible time. NCI-funded studies on the causes of cancer range from small-scale laboratory-based research to large-scale studies that use population cohorts or case-controlled comparisons of subpopulations. The studies may also involve modeling to determine cancer risk for individuals or within populations. Through such studies, NCI research strives to identify the causes of cancer.

Budget Policy:

The FY 2020 President's Budget request is \$862.6 million, a decrease of \$150.9 million, or 14.9 percent, compared with the FY 2019 Enacted level.

Examples of initiatives under this NCI research goal include:

Lung Cancer in Never Smokers: NCI is commencing a new, large study to better understand causes of lung cancer in those who never smoked. In the United States, 10 to 15 percent of people who die from lung cancer each year never smoked and never used any form of tobacco.

Targeting Fusion Oncoproteins: In some cancers, parts of two separate genes join to form a new gene, known as a fusion oncoprotein. There are at least 100 different fusion oncoproteins that alter normal cell functions and drive the development of many childhood cancers. To make progress in this area of research, during 2018, NCI supported the Fusion Oncoproteins in Childhood Cancers Consortium through Cancer MoonshotSM.

Building a Global Proteogenomics Cancer Atlas: The field of proteogenomics integrates genomic and proteomic information to gain deeper insights into molecular signatures present in cancer. During FY 2018, NCI received the first major data set of the International Cancer Proteogenome Consortium (ICPC), a partnership of leading research centers around the world.

III. Detecting and Diagnosing Cancer

Many deaths occur because cancers are diagnosed at late stages when treatment is often less effective. NCI-supported researchers are working on techniques to image tumors earlier and identify molecules, nucleic acids, proteins, metabolites, and other substances, that may improve early detection and diagnosis. This often involves uncovering the distinct molecular signatures of cancers and developing and refining molecular tests to detect cancer.

NCI has an array of programs to advance all aspects of early cancer detection and diagnosis:

- Developing new technologies and improving existing methods of noninvasive imaging to support cancer diagnosis, to identify disease subsets in patients, to determine the stage of disease, and to monitor the progress of cancer treatment;
- Coordinating efforts to obtain high-quality tissue specimens and data for the research community, and developing databases of molecularly characterized specimens; and
- Maintaining infrastructure and programs such as the Genomic Data Commons, the Cancer Genome Characterization Initiative, and The Cancer Genome Atlas (with the National Human Genome Research Institute) to improve cancer detection and diagnosis.

Investigator-initiated research project grants are one of the mechanisms NCI relies on to support and improve early detection and diagnosis of cancer. However, other larger research programs also play important roles, as examples listed above illustrate.

Budget Policy:

The FY 2020 President's Budget request is \$498.0 million, a decrease of \$100.4 million, or 16.8 percent, compared with the FY 2019 Enacted level.

Other initiatives under this goal include:

Better Screening for Breast Cancer: NCI is supporting a large clinical trial to determine whether tomosynthesis technology should routinely be added to digital mammography (DM) for breast cancer screening. The Tomosynthesis Mammographic Imaging Screening Trial (TMIST), will provide evidence of the ability of these technologies to detect breast cancer and reduce the incidence of advanced cancers.

Enhancing Cervical Cancer Screening: A long-standing impediment to reducing the incidence and mortality of cervical cancer is making effective screening available, while avoiding problems due to overtreatment. To address these issues, a research group led by NCI intramural

scientists will refine and validate optimal cervical screening strategies for high- and low-resource settings.

Data Sharing for Cancer Discovery: NCI promotes data sharing across the cancer research community to foster collaboration, accelerate discovery, and advance precision medicine. Examples of NCI data initiatives include the Cancer Research Data Commons (CRDC) and its components: the Genomic Data Commons (GDC) and the Proteomic Data Commons (PDC).

Refining Liquid Biopsy: In liquid biopsy, cancer cells or their components can be detected through minimally invasive means in samples of blood or other body fluids. During 2018, a consortium of international and NCI-supported researchers developed CancerSEEK, a blood test to measure the levels of eight proteins and the presence of mutations in 16 cancer-related genes.

IV. Treating Cancer and Improving Survivorship

Research on cancer therapy has many facets that go beyond developing and testing drugs, radiotherapy, immunotherapy, and surgery. These include controlling symptoms, improving care, and enhancing long-term survivorship and quality of life. Developing new therapies and the means to monitor cancers before and during treatment are central to successfully treating cancer. Increasingly, progress is linked to knowledge about molecular fingerprints of tumors, the structure of cancer-associated molecules and how to target them with new drugs, how cancer cells interact with the host environment and the immune system, and the altered behaviors of cancer cells.

To develop and improve cancer treatments, NCI invests in basic, translational, and clinical research. These investments identify therapeutic targets and strategies, and commercial interests frequently validate these targets and develop interventions against them. NCI supports clinical research to develop and test interventions at many sites across the country.

Budget Policy:

The FY 2020 President's Budget request is \$987.6 million, a decrease of \$164.2 million, or 14.3 percent, compared with the FY 2019 Enacted level.

Examples include:

Cancer Immunotherapies: Immunotherapies, which include checkpoint inhibitors and CAR T-cell therapies, have revolutionized cancer treatment and demonstrated lasting clinical benefit in many cancer indications. As well as developing new therapies in this promising field of research, NCI is identifying biomarkers of response and resistance, and is addressing ways to reduce adverse events and mitigate side effects of therapy.

Embracing the Potential of Big Data: NCI supports efforts to share, aggregate, and analyze the large amounts of data generated across the continuum of cancer research, surveillance, and clinical care. A signature initiative is the Cancer Research Data Commons, NCI's cloud-based informatics infrastructure to foster data aggregation and sharing.

Patient-Reported Outcomes Data to Improve Cancer Treatment: In FY 2018, NCI launched "Improving Management of symPtoms Across Cancer Treatments (IMPACT)" to support research to develop scalable, transferrable, and sustainable models to monitor and address symptoms of cancer patients during and following treatment. The initiative supports three research centers and one coordinating center within a unified research consortium.

NCI Program Portrait: The Cancer MoonshotSM**FY 2019 Level \$400.0 million****FY 2020 Level \$195.0 million****Change -\$205.0 million**

In December 2016, Congress took a bold and visionary step by enacting the Cancer Moonshot as a component of the 21st Century Cures Act. The Cancer Moonshot authorizes \$1.8 billion across seven fiscal years by supporting a range of promising science that will accelerate the pace of cancer discovery.

In FY 2019, NCI passed the mid-point of Moonshot funding, with \$1.0 billion appropriated to date. The Cures Act authorizes \$195.0 million for Moonshot research during FY 2020.

The Cancer Moonshot is an opportunity for NCI and its research partners to make sustained progress in ways that deliver tangible benefits for patients with all types of cancer and for those at risk of cancer. To maximize the opportunity for NCI to achieve this important objective, Congress appropriated Moonshot resources to remain available until expended (also known as “no-year” funding). This greatly increases NCI flexibility to structure research initiatives and make Moonshot awards. For example, the no-year nature of Moonshot funding allows NCI to reserve multiple years of grant funding to researchers at the time of the initial award. This approach enhances the ability of extramural scientists to plan and execute their research, while still allowing NCI to continue to monitor research progress. In subsequent years, this reduces the financial burden of non-competing Moonshot awards. It also ensures NCI can support new research initiatives in years when the seven-year stream of Moonshot funding is variable or declining.

Examples of NCI Moonshot Initiatives:

- NCI is funding two research teams, one focusing on immunotherapeutic approaches in adults and a second one focusing on children. The Immuno-Oncology Translational Network, which engages 31 principal investigators at 19 institutions, is investigating mechanisms by which tumors in adults interact with the immune system, developing new immune-based therapies, and designing approaches to minimize the risk of treatment side effects.
- Because most pediatric cancers are biologically different from adult cancers, NCI funded a second network to identify immune targets and treatments specific to pediatric cancers and to develop laboratory models for testing immunotherapies against these cancers.
- NCI launched the Human Tumor Atlas Network (HTAN), a collaborative effort involving investigators at 10 research centers and an umbrella data management center. HTAN researchers will perform intensive analyses of tumor and tissue samples to construct 4-dimensional maps of human cancers. These maps will capture how cancers change over time, from a precancerous lesion, to established tumor, to resistant tumor, to metastasis, and describe the composition of the types of cells within and around a tumor and the genetic makeup of those cells.
- NCI is establishing a network for directly engaging patients to allow patients diagnosed with cancer to have their tumors molecularly profiled and to pre-register patients for clinical trials they may become eligible to join. Other features include a biobank for storing tumor samples, tissue specimens, and associated patient data.

As these and other examples demonstrate, the Cancer Moonshot represents an opportunity for NCI and its research partners to make sustained progress in ways that change the course of cancer.

Improving Cancer Survivorship: Millions of adults and children in the United States are cancer survivors, and the number of survivors is expected to grow to more than 26 million by 2040. Cancer survivors frequently experience short- and long-term adverse effects from cancer

and its treatment, effects that can last a lifetime and are a special concern for survivors of childhood cancers. The Childhood Cancer Survivor Study (CCSS), an initiative funded by NCI and supported by a network of more than 30 collaborating institutions, maintains data on more than 24,000 survivors who experienced cancer in childhood and adolescence.

Pediatric MATCH Trial: In recognition that childhood cancers are genetically distinct from adult cancers, the NCI-supported Children's Oncology Group launched the Pediatric MATCH Trial (Molecular Analysis for Therapy Choice) in July 2017. The Pediatric MATCH Trial screens tumor samples for genetic changes.

V. Improving Cancer Prevention and Control

Cancer prevention research focuses on actions that individuals can take to lower their risk of getting cancer. Such actions include maintaining a healthy lifestyle, avoiding exposure to cancer-causing substances, and taking medicines or vaccines that can prevent cancer from developing. Prevention should ideally be tailored to an individual's underlying risk of developing cancer. Cancer prevention draws on our growing knowledge of the mechanisms and causes of cancer. Prevention also relies on population-based surveys to obtain epidemiological information, such as the incidence of specific types of cancers and factors that may cause a specific cancer. Through education, behavior modification, vaccination or preventive medications, and policies that limit exposures to carcinogens, overall risk of cancer may be reduced by one-third to one-half.

Cancer control science relies on basic and applied research in behavioral, social, and population sciences to enhance interventions that reduce cancer risk, incidence, morbidity and mortality, and improve quality of life. Cancer control seeks to understand the causes and distribution of cancer throughout the population, identify and implement effective healthcare practices to reduce cancer incidence, and monitor and explain cancer trends and health disparities in the population. Cancer control research aims to generate basic knowledge about how to monitor and change individual and collective behavior and translate that knowledge into practice.

To improve cancer prevention and control, NCI supports research to understand the factors that influence cancer outcomes, quality of care, and quality of life. NCI also promotes studies in underserved communities to advance the goal of controlling cancer more effectively for all populations.

Budget Policy:

The FY 2020 President's Budget request is \$193.1 million, a decrease of \$30.1 million, or 13.5 percent, compared with the FY 2019 Enacted level.

Examples of initiatives under this NCI research goal include:

Reducing Tobacco Use: NCI supports research to study the associations between tobacco use and cancer, to inform public health decisions, and to design interventions to reduce the burden of tobacco-related disease. NCI researchers and federal partners are currently studying the health risks of tobacco and tobacco-related products, including smokeless tobacco, flavored cigarillos, electronic nicotine delivery systems, and hookahs (water pipes).

Identifying and Caring for Individuals with Inherited Cancer Syndromes: In FY 2018, NCI funded research to improve prevention and early detection in individuals at high risk of cancer.

Through this research, NCI seeks to optimize delivery of evidence-based health care for individuals at risk due to an inherited genetic trait.

Rare Tumor Natural History Study: Rare cancers make up approximately 25.0 percent of adult malignancies and 100 percent of pediatric malignancies. To address this challenge, the NCI intramural program launched the Natural History and Biospecimen Accrual Study to better understand the natural history and clinical features of rare cancers.

Developing Immune-Based Interventions for Cancer Prevention: As a component of the Cancer Immunotherapy Consortium, the Immuno-Oncology Translational Network (IOTN) is conducting research to identify the earliest changes that occur in the carcinogenic process.

Improving Cancer Control Research in Rural Communities: Compared with people living in urban locations, those residing in rural areas experience a lower incidence of cancer, but a higher overall mortality rate if diagnosed with cancer. To lay groundwork for more effective programs, NCI is supporting research conducted to improve cancer control in rural areas.

Human Papillomavirus (HPV) Vaccine Trial: HPV vaccination successfully prevents HPV infections, related precancerous lesions, and cervical and other HPV-related cancers. However, HPV vaccination rates are too low, especially in countries with very high rates of cervical cancer and low health care resources. With these challenges in mind, NCI investigators and their partners are conducting a randomized clinical trial to evaluate benefits of a single vaccine dose.

VI. Cancer Centers

The NCI Cancer Centers program is a key component of the nation's cancer research efforts. Together with their community partners, the 70 NCI-designated Cancer Centers, located in 35 states and the District of Columbia, form the backbone of NCI's extramural program for studying and controlling cancer. NCI-designated Cancer Centers are the nation's single most important source of new insights into the causes of cancer and strategies to prevent, diagnose, and treat cancer. Research proposals from Cancer Center investigators account for about three-quarters of successful NCI investigator-initiated grants.

Budget Policy:

The FY 2020 President's Budget request is \$487.8 million, a decrease of \$187.3 million, or 27.7 percent, compared with the FY 2019 Enacted level.

Important research at NCI Cancer Centers includes:

- At the Rutgers Cancer Institute of New Jersey, researchers contributed to understanding breast cancer subtypes among African American breast cancer survivors through studies that evaluated survival and quality of life outcomes across ten New Jersey counties. The findings have important implications for primary prevention and provide insights on the need to enhance breast cancer screening for African American women.
- At the University of California San Diego Moores Cancer Center, research conducted with Asian language smokers demonstrated significant quitting rates among those receiving a pharmaceutical aid to curb smoking in combination with behavioral counseling. This led to an Asian language helpline to meet the needs of smokers speaking Korean, Vietnamese, and two Chinese dialects.

- At the Dan L. Duncan Comprehensive Cancer Center at Baylor College of Medicine and the University of North Carolina Lineberger Comprehensive Cancer Center, researchers tested a first-in-human chimeric antigen receptor CAR T-cell approach for refractory Hodgkin's Disease and other forms of lymphoma. In December 2018, this group reported a 75.0 percent clinical benefit rate of this novel CAR approach in patients who had failed multiple rounds of therapy for advanced, refractory cancer.

In addition to designated Cancer Centers, NCI supports more than 100 other specialized centers.

VII. Research Workforce Development

NCI has a long-standing commitment to train, develop, and support a strong workforce of cancer researchers spanning the career continuum. The NCI investment in early stage investigators helps attract talented scientists to ensure the strength of future cancer research. In addition to NCI's direct support for training, support for established investigators, scientists who have proven their ability to conduct robust science, fosters mentoring for the next generation of cancer researchers.

NCI also supports programs designed to develop a cancer research workforce that reflects the nation that we serve. The NCI Center to Reduce Cancer Health Disparities (CRCHD) is NCI's focal point to achieve this important goal.

Budget Policy:

The FY 2020 President's Budget request is \$184.9 million, a decrease of \$9.7 million, or 5.0 percent, compared with the FY 2019 Enacted level.

Examples of CRCHD programs include:

- Continuing Umbrella of Research Experiences (CURE)
- Intramural Continuing Umbrella of Research Experiences (iCURE)
- Supplements to Support Training in Tribal Communities
- Youth Enjoy Science (YES) Research Education Program
- Partnerships to Advance Cancer Health Equity (PACHE)

NCI Program Portrait: Training Cancer Researchers of the Future

FY 2019 Level \$199.0 million*

FY 2020 Level \$189.0 million*

Change -\$10.0 million

NCI has a broad array of training opportunities to develop cancer researchers of the future. NCI supports opportunities for training in basic, clinical, and behavioral research through formal training, individual fellowships, and career development awards. NCI training occurs at universities and other institutions across the country. In addition, NCI supports research experiences for high school, college, graduate, and medical school students, and postdoctoral fellows working in NCI intramural research programs. Recipients of training and career development grants span the career continuum and include pre-doctoral candidates, postdoctoral fellows, new faculty in independent research positions, and established midcareer investigators.

NCI is committed to supporting a well-defined career path to research independence for scientists. During FY 2018, NCI funded the third round of a new mechanism, the F99/K00, to support the transition from graduate research to postdoctoral training. This new mechanism positions individuals receiving these awards to be competitive for a second NCI transition mechanism to advance their independence, the K99/R00, which supports the transition from postdoctoral training to serving as a tenure track investigator. These mechanisms will provide awardees with resources and a meaningful pathway to smoothly achieve these challenging transitions. More than 90.0 percent of the first cohort of F99 awardees have successfully transitioned to the K00 phase, securing postdoctoral positions in top laboratories. The F99 awardees have been highly productive, with 168 publications, including 16 first-author papers in journals such as *Cell* and *Science*.

NCI also merged two other career development mechanisms, the K08 and K23, to allow more physician-scientists to compete for support based on their best scientific ideas. This approach will avoid creating an artificial boundary that forces applicants into specific research disciplines. During FY 2018, NCI increased the level of salary support available per award under the K08 mechanism to the maximum salary allowed for principal investigators. NCI also increased the research funding that K08 investigators receive. These changes have contributed to a significant 70.0 percent increase in the number of applications from physician-scientists pursuing cancer research.

NCI is one of four NIH institutes participating in the R38 Stimulating Access to Research in Residency (StARR) program. StARR is designed to recruit and retain outstanding postdoctoral-level health professionals who have demonstrated potential and interest in pursuing careers as clinician-investigators. In addition, in FY 2019, NCI will participate in the K38 Stimulating Access to Research in Residency Transition Scholar (StARRTS) Program. This program provides continued mentored research opportunities for the StARR Transition Scholars during their subspecialty clinical training fellowships.

Finally, NCI continues to explore new approaches to attract and support physician-scientists to conduct research during clinical training. To advance this goal, NCI opened its K12 programs, which typically support junior faculty and clinical fellows, to residents interested in research.

*Consists of funding in research workforce development and additional training-related awards captured in other budget activities (F99/K00 and R38 awards)

VIII. Intramural Research

The activities of NCI's intramural research program complement all aspects of the National Cancer Program. The scientists, physicians, and clinicians who make up the NCI intramural research program conduct basic, clinical, genomic, and population-based research. NCI intramural research emphasizes high-risk, high-reward cancer research that would otherwise not be conducted by other entities. The many accomplishments of the intramural research program appear within the program descriptions for the five NCI scientific goals (i.e., understanding how cancer develops, understanding the causes of cancer, detecting and diagnosing cancer, treating

cancer and improving survivorship, and improving cancer prevention and control).

Budget Policy:

The FY 2020 President's Budget request is \$857.4 million, a decrease of \$103.3 million, or 10.8 percent, compared with the FY 2019 Enacted level.

IX. Research Management and Support

NCI research management and support personnel serve an indispensable role by supporting and enabling the success of all NCI-funded programs. This staff conducts activities that include but are not limited to central administration, overall program direction, grant and contract administration, human resources, program coordination, and financial management.

Budget Policy:

The FY 2020 President's Budget request is \$393.9 million, a decrease of \$66.5 million, or 14.4 percent, compared with the FY 2019 Enacted level.

X. Repairs and Improvements

Funding for Repairs and Improvements allows NCI to operate the Frederick National Laboratory for Cancer Research (FNLCR) as a modern research enterprise and to maintain essential infrastructure at the Frederick research campus.

Budget Policy:

The FY 2020 President's Budget request is \$14.0 million, a decrease of \$4.0 million, or 22.2 percent, compared with the FY 2019 Enacted level.

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Budget Authority by Object Class¹
(Dollars in Thousands)

	FY 2019 Enacted	FY 2020 President's Budget	FY 2020 +/- FY 2019
Total compensable workyears:			
Full-time equivalent	3,035	3,035	0
Full-time equivalent of overtime and holiday hours	8	8	0
Average ES salary	\$190	\$190	\$0
Average GM/GS grade	12.5	12.5	0.0
Average GM/GS salary	\$114	\$114	\$0
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$104	\$107	\$3
Average salary of ungraded positions	\$152	\$152	\$0
OBJECT CLASSES	FY 2019 Enacted	FY 2020 President's Budget	FY 2020 +/- FY 2019
Personnel Compensation			
11.1 Full-Time Permanent	231,568	232,448	880
11.3 Other Than Full-Time Permanent	123,932	124,403	471
11.5 Other Personnel Compensation	12,615	12,663	48
11.7 Military Personnel	3,112	3,217	105
11.8 Special Personnel Services Payments	59,454	59,680	226
11.9 Subtotal Personnel Compensation	\$430,680	\$432,410	\$1,729
12.1 Civilian Personnel Benefits	122,069	124,376	2,307
12.2 Military Personnel Benefits	2,178	2,251	73
13.0 Benefits to Former Personnel	0	0	0
Subtotal Pay Costs	\$554,927	\$559,037	\$4,110
21.0 Travel & Transportation of Persons	15,376	9,829	-5,547
22.0 Transportation of Things	1,294	845	-449
23.1 Rental Payments to GSA	20,475	15,356	-5,119
23.2 Rental Payments to Others	51	27	-24
23.3 Communications, Utilities & Misc. Charges	21,555	13,078	-8,477
24.0 Printing & Reproduction	75	39	-36
25.1 Consulting Services	78,470	46,132	-32,338
25.2 Other Services	532,616	357,325	-175,291
25.3 Purchase of goods and services from government accounts	691,090	633,987	-57,103
25.4 Operation & Maintenance of Facilities	29,737	20,212	-9,525
25.5 R&D Contracts	349,432	227,616	-121,816
25.6 Medical Care	4,470	3,353	-1,118
25.7 Operation & Maintenance of Equipment	21,842	15,700	-6,142
25.8 Subsistence & Support of Persons	507	327	-180
25.0 Subtotal Other Contractual Services	\$1,708,165	\$1,304,653	-\$403,512
26.0 Supplies & Materials	39,427	29,257	-10,170
31.0 Equipment	22,267	16,321	-5,946
32.0 Land and Structures	0	0	0
33.0 Investments & Loans	0	0	0
41.0 Grants, Subsidies & Contributions	3,760,277	3,298,292	-461,985
42.0 Insurance Claims & Indemnities	1	1	0
43.0 Interest & Dividends	2	2	0
44.0 Refunds	0	0	0
Subtotal Non-Pay Costs	\$5,588,965	\$4,687,700	-\$901,265
Total Budget Authority by Object Class	\$6,143,892	\$5,246,737	-\$897,155

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

NATIONAL INSTITUTES OF HEALTH
National Cancer 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)	\$231,568	\$232,448	\$880
Other Than Full-Time Permanent (11.3)	123,932	124,403	471
Other Personnel Compensation (11.5)	12,615	12,663	48
Military Personnel (11.7)	3,112	3,217	105
Special Personnel Services Payments (11.8)	59,454	59,680	226
Subtotal Personnel Compensation (11.9)	\$430,680	\$432,410	\$1,729
Civilian Personnel Benefits (12.1)	\$122,069	\$124,376	\$2,307
Military Personnel Benefits (12.2)	2,178	2,251	73
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	\$554,927	\$559,037	\$4,110
Travel & Transportation of Persons (21.0)	\$15,376	\$9,829	-\$5,547
Transportation of Things (22.0)	1,294	845	-449
Rental Payments to Others (23.2)	51	27	-24
Communications, Utilities & Misc. Charges (23.3)	21,555	13,078	-8,477
Printing & Reproduction (24.0)	75	39	-36
Other Contractual Services:			
Consultant Services (25.1)	29,627	16,906	-12,720
Other Services (25.2)	532,616	357,325	-175,291
Purchases from government accounts (25.3)	527,747	472,215	-55,533
Operation & Maintenance of Facilities (25.4)	15,691	11,152	-4,539
Operation & Maintenance of Equipment (25.7)	21,842	15,700	-6,142
Subsistence & Support of Persons (25.8)	507	327	-180
Subtotal Other Contractual Services	\$1,128,030	\$873,626	-\$254,404
Supplies & Materials (26.0)	\$39,427	\$29,257	-\$10,170
Subtotal Non-Pay Costs	\$1,205,808	\$926,700	-\$279,107
Total Administrative Costs	\$1,760,735	\$1,485,737	-\$274,998

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

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 Cancer Research									
Direct:	1,283	16	1,299	1,321	13	1,334	1,321	13	1,334
Reimbursable:	9	-	9	9	-	9	9	-	9
Total:	1,292	16	1,308	1,330	13	1,343	1,330	13	1,343
Division of Cancer Biology									
Direct:	50	-	50	50	2	52	50	2	52
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	50	-	50	50	2	52	50	2	52
Division of Cancer Control and Population Sciences									
Direct:	167	2	169	174	-	174	174	-	174
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	169	2	171	176	-	176	176	-	176
Division of Cancer Epidemiology and Genetics									
Direct:	153	3	156	164	3	167	164	3	167
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	153	3	156	164	3	167	164	3	167
Division of Cancer Prevention									
Direct:	102	3	105	108	1	109	108	1	109
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	102	3	105	108	1	109	108	1	109
Division of Cancer Treatment and Diagnosis									
Direct:	217	5	222	228	5	233	228	5	233
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	217	5	222	228	5	233	228	5	233
Division of Extramural Activities									
Direct:	100	1	101	101	1	102	101	1	102
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	100	1	101	101	1	102	101	1	102
Office of the Director									
Direct:	832	6	838	847	6	852	846	6	852
Reimbursable:	1	-	1	1	-	1	1	-	1
Total:	833	6	839	848	6	853	847	6	853
Total	2,916	36	2,952	3,005	31	3,035	3,004	31	3,035
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	12.4								
2017	12.4								
2018	12.5								
2019	12.5								
2020	12.5								

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

Detail of Positions¹

GRADE	FY 2018 Final	FY 2019 Enacted	FY 2020 President's Budget
Total, ES Positions	1	2	4
Total, ES Salary	189,600	379,200	758,400
GM/GS-15	295	288	288
GM/GS-14	485	486	486
GM/GS-13	468	477	477
GS-12	443	448	448
GS-11	163	162	162
GS-10	10	10	10
GS-9	95	90	90
GS-8	55	53	53
GS-7	44	46	46
GS-6	11	11	11
GS-5	10	8	8
GS-4	7	8	8
GS-3	5	6	6
GS-2	2	2	2
GS-1	3	4	4
Subtotal	2,096	2,099	2,099
Grades established by Act of July 1, 1944 (42 U.S.C. 207)	0	0	0
Assistant Surgeon General	0	0	0
Director Grade	15	12	12
Senior Grade	8	8	8
Full Grade	7	7	7
Senior Assistant Grade	6	4	4
Assistant Grade	0	0	0
Subtotal	36	31	31
Ungraded	875	911	911
Total permanent positions	2,117	2,177	2,177
Total positions, end of year	3,007	3,042	3,042
Total full-time equivalent (FTE) employment, end of year	2,952	3,035	3,035
Average ES salary	189,600	189,600	189,600
Average GM/GS grade	12.5	12.5	12.5
Average GM/GS salary	113,609	113,609	113,609

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