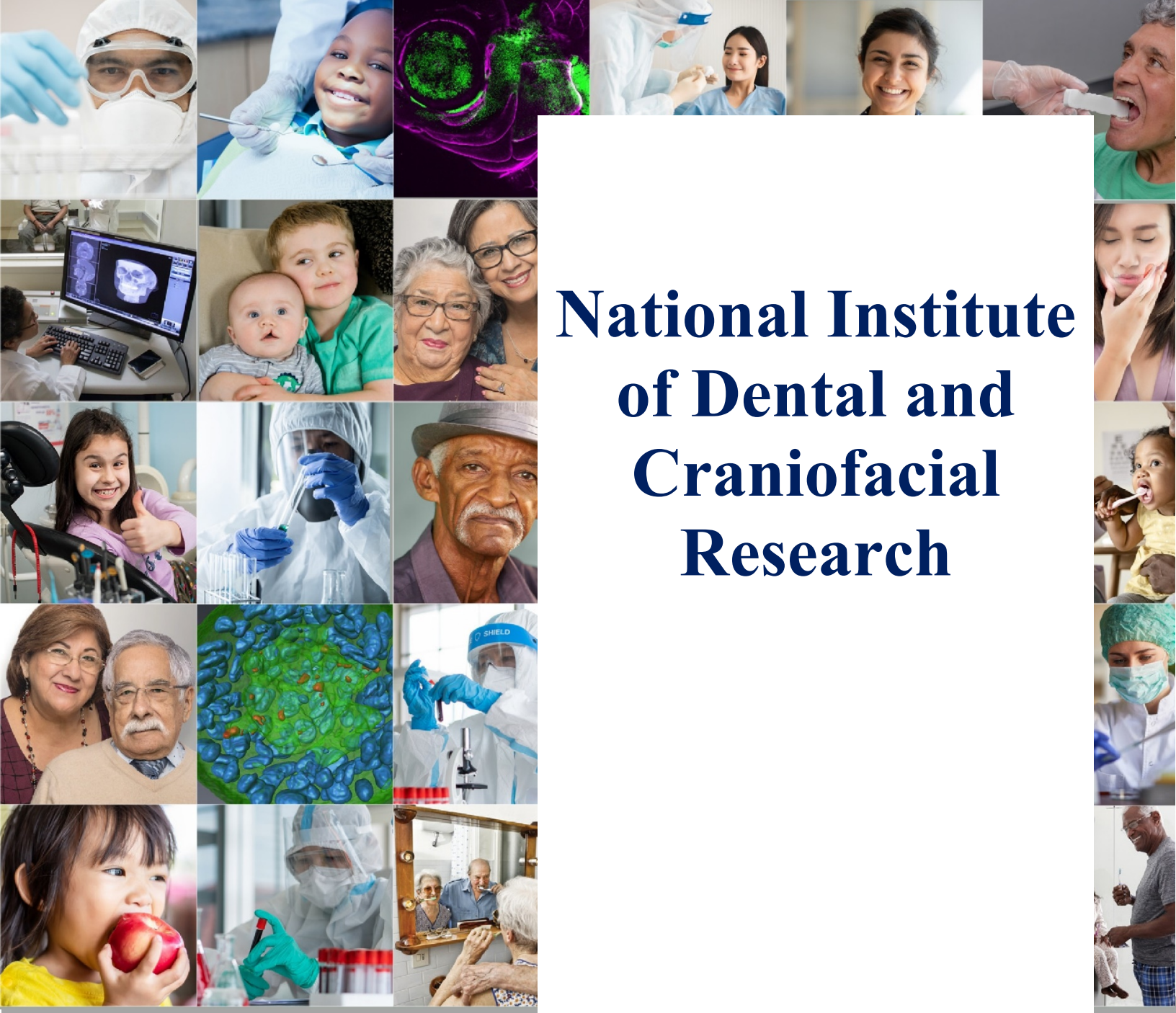


National Institute of Dental and Craniofacial Research

CONGRESSIONAL JUSTIFICATION
FY 2022

Department of Health and Human Services
National Institutes of Health

NIH National Institute of Dental and Craniofacial Research

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of Dental and Craniofacial Research (NIDCR)

FY 2022 Budget Table of Contents Page No.

Director's Overview

In October of 2020, NIDCR welcomed new Director Rena N. D'Souza, D.D.S., M.S., Ph.D. Dr. D'Souza is a licensed dentist and brings with her a long history of academic leadership, as well as significant research experience in craniofacial and tooth development, genetics, and regenerative dental medicine. Dr. D'Souza is a champion of diversity in the biomedical research workforce and committed to inclusion, equity, and diversity.

NIDCR Director
Dr. Rena D'Souza, D.D.S., M.S., Ph.D.

At NIDCR, we continue to build upon our strategic investments in dental, oral, and craniofacial research to address standing and emergent public health challenges such as the COVID-19 pandemic, oral health disparities and inequities, chronic orofacial pain syndromes, such as temporomandibular joint disorders (TMJDs), opioid use and pain, the potential negative oral health consequences of rising e-cigarette use among teens and young adults, and HPV-associated oral cancers.

NIDCR's immediate-impact research response to COVID-19

The 27 Institutes and Centers of the National Institutes of Health (NIH) immediately responded to the COVID-19 pandemic with a wide array of initiatives and funding opportunities to rapidly increase scientific knowledge about this new, highly infectious virus. Several teams of NIDCR intramural investigators quickly adapted their research to focus on this public health emergency. One group is examining the role that viral load – the amount of SARS-CoV-2 found in saliva droplets – plays in transmission of the disease, especially during speech. This study not only suggests that saliva sampling could offer a much less intrusive method than nasal swabbing to test for COVID-19, it also reinforces the importance of facial coverings as an important deterrent to infection. Another team cleverly adapted a viral antibody-detecting method invented 15 years ago so that it has the power to detect even trace amounts of antibodies in people with COVID-19 infection. They are continuing to advance this technology to develop a rapid, user-friendly version for point of care screening in community settings. This ability to rapidly respond to emerging public health emergencies reinforces the unique capabilities of the NIDCR intramural research program.

At NIDCR, we also swiftly funded research to ensure the safety of practitioners and patients in dental care settings, by leveraging our longstanding investment in the National Dental Practice-Based Research Network, a consortium of dental practitioners across the country participating in research to answer questions of everyday relevance to dental practice. Since many dental procedures generate aerosols, dental care professionals are more susceptible to virus transmission by droplets, which means important modifications in dental practice may be necessary to reduce the risk of SARS-CoV-2 transmission. Two studies are looking at the physics of aerosolization during different dental procedures under different conditions, like room layout. Another is developing strategies to ensure that dental staff safely put on and remove their personal

protective equipment. We will continue to utilize this valuable research consortium in ongoing efforts to better protect dental practitioners and their patients from SARS-CoV-2 infection.

Accurate, fast, easy-to-use, and widely accessible COVID-19 testing is essential for the nation to safely return to normal life. We are participating in an NIH-wide initiative – Rapid Acceleration of Diagnostics (RADx) – to speed the development, commercialization, and implementation of technologies for COVID-19 testing. We are co-leading two initiatives under RADx. One is accelerating the commercial development of oral biosensing devices to demonstrate their safety and effectiveness in preclinical studies, which could use artificial intelligence to not just detect virus, but also other disease manifestations in the mouth, like changes in blood oxygenation levels. The second explores the molecular underpinnings of the sudden loss of smell and/or taste – a common symptom of COVID-19 onset – to identify specific biomarkers. This molecular signature could be used to develop a test for people to use alongside temperature screening as a valuable self-diagnostic tool. Additionally, we are an active participant in RADx Underserved Populations (RADx-UP), an initiative to better address a significant public health issue – the disproportionate impact of COVID-19 upon underserved and vulnerable populations in the United States. RADx-UP will identify disparities in infection rates, disease progression, and outcomes to generate strategies to reduce these disparities through increased access and uptake of COVID-19 testing.

NIDCR works to reduce health disparities and increase research workforce diversity

Although considerable progress has been made in the prevention, diagnosis, and treatment of oral diseases, conditions such as dental caries (tooth decay) and periodontal disease remain among the most common health problems that most impact disadvantaged and underserved communities. At NIDCR, we support a comprehensive portfolio of clinical, behavioral, and social sciences research to address the significant oral health inequities that continue to exist in certain communities. Because good oral health habits begin in childhood, in 2015 we launched the Multidisciplinary and Collaborative Research Consortium to Reduce Oral Health Disparities in Children. Through the Consortium, one clinical trial is demonstrating the feasibility and promise of oral health behavior change using a simple accessible strategy of interactive text messaging with parents of young children. Another study is leveraging the revolution in mobile technology to advance a smart toothbrush-based incentive program to encourage optimal toothbrushing habits. In a collaboration with the National Institute of General Medical Sciences (NIGMS), we also support a study among pregnant women in the Yukon Kuskokwim Delta region of Alaska to investigate the impact of prenatal vitamin D supplementation upon early childhood caries in their children. Preliminary results indicate that this affordable, easy to implement approach has reduced the amount of dental caries in the children of mothers who receive the supplements.

We value diversity in the research workforce, as studies show that the quality of biomedical research is at its best when investigators' backgrounds are as diverse as their expertise, perspectives, and ideas. In support of this priority, we recently awarded a five-year grant to the American Association for Dental Research (AADR) to establish Mentoring an Inclusive Network for a Diverse Workforce of the Future (AADR MIND the Future) – a mentoring network that provides a structured pathway for a diverse group of early career investigators to

transition to independent research. The first 10 participants were announced in May 2020 and have now entered an intense year-long program of educational activities and career-building exercises. Ten new individuals will be added to the program annually during each of the next five years, culminating in a vibrant and inclusive network of diverse mentors and mentees who will continue to support each other throughout the course of their research careers dedicated to improving dental, oral and craniofacial health.

Update to the 2000 Surgeon General's Report on Oral Health

Lastly, as NIDCR is the largest funder in the world of oral health research, we are taking the lead in a federal, multi-agency effort to produce an update to the Surgeon General's Report on Oral Health 2000. This new report will be released by NIDCR and will delineate the successes and challenges faced in our shared commitment to improve the oral health of the nation. Expertise from a broad and diverse group of stakeholders was gathered to paint a comprehensive portrait of the current state of oral health in the United States. The report will act as a call to action for a coordinated effort among oral health practitioners, researchers, professional and patient organizations, local, state, and federal governments, and other engaged communities to improve oral health for all Americans.

Overall Budget Policy: The FY 2022 President's Budget request for NIDCR is $516.2 million, an increase of $31.4 million or 6.5 percent compared with the FY 2021 Enacted level. This increase will allow NIDCR to increase research across all its program areas, with roughly half of the increase targeted toward research into safer, non-addictive pain therapeutics that will reduce or eliminate the need for opioids.

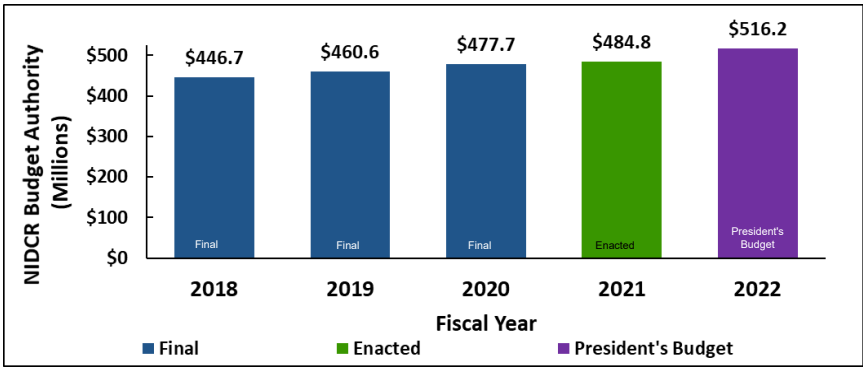
National Institute of Dental and Craniofacial Research

The National Institute of Dental and Craniofacial Research (NIDCR) accomplishes its mission of improving dental, oral, and craniofacial health by:

- Performing and supporting basic, translational, and clinical research;
- Supporting research training and career development programs to ensure a talented, well-prepared, and diverse workforce;
- Promoting transfer of new knowledge gained from research to the public, health professionals, researchers, and policymakers.

NIDCR is also building on its foundation of basic and translational oral health research to close the gap in health disparities and address public health challenges like COVID-19, opioid use and pain, temporomandibular joint disorders (TMJDs), rising e-cigarette use among teens and young adults, and human papillomavirus (HPV)-positive oral cancers.

NIDCR Director Dr. Rena D'Souza, a licensed dentist and well-established researcher in the fields of craniofacial and tooth development, genetics, and regenerative dental medicine joined NIH in the fall of 2020 from the University of Utah.

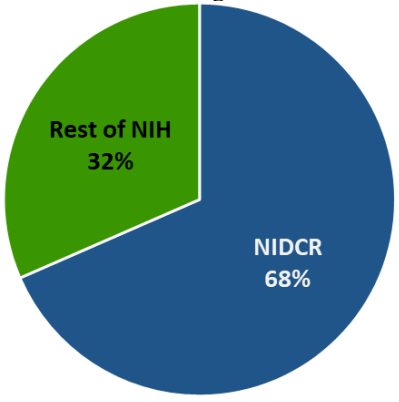


Research Highlights

- Developed a new technology to treat nerve injuries that effectively restores movement and sensation to injured patients.
- Built a tool that uses artificial intelligence (AI) to aid diagnosis of rare genetic diseases in children.
- Leading a gene therapy clinical trial for salivary dysfunction and dry mouth.
- Optimized a nanoparticle-encapsulated drug to improve efficacy of non-opioid pain medications and reduce the risk of addiction.
- Engaged dental practitioners to improve oral HPV screening and implement safer opioid prescribing practices.
- Demonstrated the feasibility and promise of using text messages to improve oral health behaviors in underserved children to reduce health disparities.

NIDCR Facts

- *Largest oral health research funding organization in the world*; provides evidence base for oral health care, and for 200,000 U.S. dental practitioners
- *Supports a broad research portfolio*: cancer, microbiome, immunology, HIV/AIDS, stem cells and regenerative medicine, genetics and rare diseases, health disparities, behavioral and social
- Accounts for *68 percent of all NIH funding to U.S. dental schools* and supports *78 percent of all NIH awardees with dental or dental-PhD degrees*

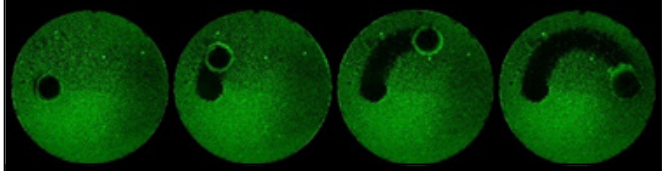


Total NIH funding to U.S. dental schools

National Institute of Dental and Craniofacial Research

Major Accomplishments

- Supported creation of the Human Oral Microbiome Database, which continues to provide new, medically significant insights into the hundreds of species of bacteria, fungi, and other microorganisms that live in our mouths.
- Funded development of magnetic nanoparticle robots that destroy and remove stubborn bacteria, like dental plaque, from surfaces. This technology could provide a new method of biofilm removal for teeth, medical implants, and medical devices (figure below).



From left to right, a magnetically controlled nanorobot removes biofilm (green) from a laboratory dish.

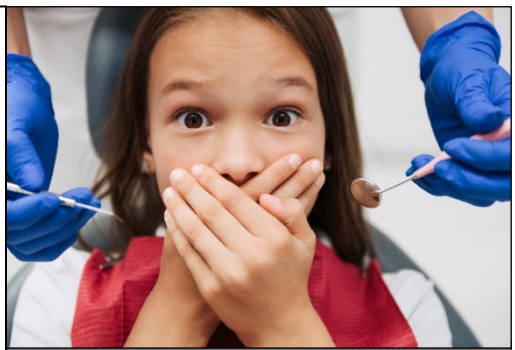
- Leveraged the NIDCR-supported National Dental Practice Based Research Network that engages over 7,000 practitioners and 60,000 participants across all 50 states to help dentists safely treat patients during the COVID-19 pandemic.

Current Activities

- Immediate-impact research to reduce SARS-CoV-2 transmission risks in dental practices through studies to determine viral load in oral secretions and reduce aerosols from dental procedures.
- Support of the Oral Health Disparities and Inequities Research Consortium to eliminate inequities in oral health and expand access to dental care in vulnerable populations.
- Research to advance chair-side diagnosis of precancerous oral lesions and test effectiveness of HPV vaccines to prevent oral cancers.
- Support a mentoring network and postdoctoral fellowships to create a more diverse and inclusive dental, oral, and craniofacial scientific workforce.
- Research to transition patients to safer, non-opioid pain medications and to discover new, non-addictive pain interventions to address the opioid overdose epidemic.
- Leading the development of the 2nd Surgeon General's Report on Oral Health, a call to action for a coordinated effort among oral health practitioners; researchers; professional organizations; local, state, and federal governments; patients; and communities to improve oral health for all Americans.

Future Initiatives

- Continue to respond to the COVID-19 emergency by supporting research on oral transmission of SARS-CoV-2, including the development of oral biosensors for detection of viral biomolecular signatures.
- Leverage a newly formed trans-NIH TMJD working group to advise on implementing recommendations from the National Academies report "Temporomandibular Disorders: Priorities for Research & Care."
- Reduce oral health disparities by better understanding how social determinants of health, like availability of healthy foods or reliable transportation, affect oral health and access to dental care.
- Establish a dual degree dentist-scientist transition award to help promising early stage researchers with dental degrees advance more easily and quickly from predoctoral to postdoctoral training.



- Eliminate barriers to dental care by supporting more research to identify causes of dental fear and anxiety and advance interventions to help people conquer their fear and anxiety of going to the dentist. Increasing access to dental care is a proven method to improve oral health.

Major Changes in the Fiscal Year 2022 President's Budget Request

Major changes by budget mechanism and/or budget detail are briefly described below. The FY 2022 President's Budget for NIDCR is $516.2 million, an increase of $31.4 million from the FY 2021 Enacted level.

Research Project Grants (+$22.1 million; total $337.2 million):
NIDCR will support a total of 728 Research Project Grant (RPG) awards in FY 2022. Noncompeting RPGs will increase by 26 awards and $14.3 million. Competing RPGs will increase by 18 awards and $6.8 million.

Other Research (+$2.3 million; total $26.0 million):
NIDCR will increase funding by 9.6 percent for Other Research. These increments will be distributed across various programmatic areas.

Research Training (+$1.0 million; total $15.0 million):
NIDCR will increase funding by 7.1 percent for Research Training.

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	467	$217,613	467	$216,397	493	$230,727	26	$14,330
Administrative Supplements	*(67)*	12,243	*(36)*	6,500	*(36)*	6,500	*(0)*	0
Competing:								
Renewal	17	8,390	19	9,381	21	10,191	2	810
New	161	61,938	180	69,250	196	75,232	16	5,982
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	178	$70,329	199	$78,631	217	$85,423	18	$6,792
Subtotal, RPGs	645	$300,185	666	$301,529	710	$322,650	44	$21,121
SBIR/STTR	17	13,409	17	13,522	18	14,511	1	989
Research Project Grants	662	$313,594	683	$315,050	728	$337,161	45	$22,111
Research Centers:								
Specialized/Comprehensive	2	$5,641	1	$3,595	1	$3,906	0	$310
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	2	$5,641	1	$3,595	1	$3,906	0	$310
Other Research:								
Research Careers	61	$8,756	63	$8,975	70	$9,975	7	$1,000
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	0	0	0	0	0	0	0	0
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	97	0	97	0	97	0	0
Other	17	11,985	15	14,647	16	15,916	1	1,268
Other Research	78	$20,839	78	$23,720	86	$25,988	8	$2,268
Total Research Grants	742	$340,073	762	$342,365	815	$367,054	53	$24,689
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	122	$5,853	125	$6,145	126	$6,360	1	$215
Institutional Awards	130	7,503	133	7,878	142	8,654	9	776
Total Research Training	252	$13,356	258	$14,023	268	$15,014	10	$991
Research & Develop. Contracts	19	$20,988	20	$22,254	20	$24,201	0	$1,947
(SBIR/STTR) (non-add)	*(0)*	*(142)*	*(0)*	*(142)*	*(0)*	*(151)*	*(0)*	*(9)*
Intramural Research	144	72,826	155	74,901	157	77,523	2	2,622
Res. Management & Support	86	30,437	92	31,299	95	32,405	3	1,105
SBIR Admin. (non-add)	*(0)*	*(1)*	*(0)*	*(10)*	*(0)*	*(10)*	*(0)*	*(0)*
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIDCR	230	$477,679	247	$484,843	252	$516,197	5	$31,354

[1] All items in italics and brackets are non-add entries.

NATIONAL INSTITUTE OF DENTAL AND CRANIOFACIAL RESEARCH

For carrying out section 301 and title IV of the PHS Act with respect to dental and craniofacial diseases, [$484,867,000]*$516,197,000.*

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Summary of Changes

(Dollars in Thousands)

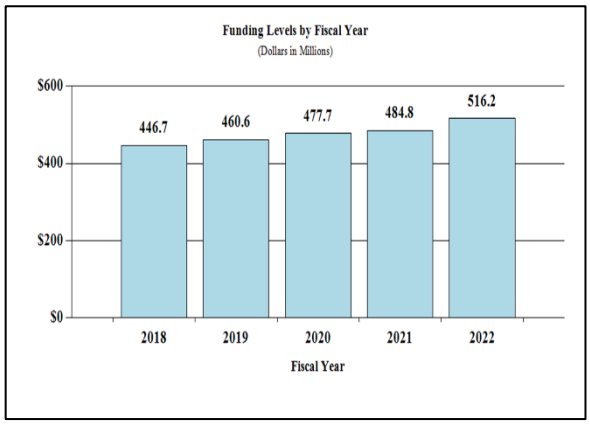
FY 2021 Enacted	$484,843
FY 2022 President's Budget	$516,197
Net change	$31,354

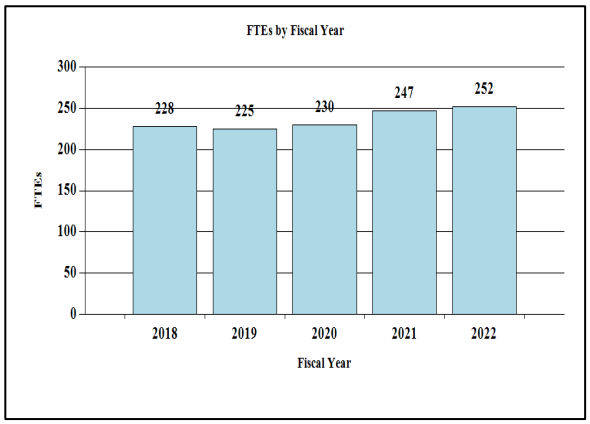
CHANGES	FY 2021 Enacted FTEs	FY 2021 Enacted Budget Authority	FY 2022 President's Budget FTEs	FY 2022 President's Budget Budget Authority	Change from FY 2021 Enacted FTEs	Change from FY 2021 Enacted Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of January 2021 pay increase & benefits		$28,088		$29,178		$75
b. January FY 2022 pay increase & benefits		28,088		29,178		776
c. Paid days adjustment		28,088		29,178		0
d. Differences attributable to change in FTE		28,088		29,178		387
e. Payment for centrally furnished services		13,311		13,977		666
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		33,502		34,368		604
Subtotal						$2,509
2. Research Management and Support:						
a. Annualization of January 2021 pay increase & benefits		$16,251		$16,977		$43
b. January FY 2022 pay increase & benefits		16,251		16,977		452
c. Paid days adjustment		16,251		16,977		0
d. Differences attributable to change in FTE		16,251		16,977		536
e. Payment for centrally furnished services		2,430		2,551		121
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		12,618		12,877		227
Subtotal						$1,380
Subtotal, Built-in						$3,888

CHANGES	FY 2021 Enacted No.	FY 2021 Enacted Amount	FY 2022 President's Budget No.	FY 2022 President's Budget Amount	Program Change from FY 2021 Enacted No.	Program Change from FY 2021 Enacted Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	467	$222,897	493	$237,227	26	$14,330
b. Competing	199	78,631	217	85,423	18	6,792
c. SBIR/STTR	17	13,522	18	14,511	1	989
Subtotal, RPGs	683	$315,050	728	$337,161	45	$22,111
2. Research Centers	1	$3,595	1	$3,906	0	$310
3. Other Research	78	23,720	86	25,988	8	2,268
4. Research Training	258	14,023	268	15,014	10	991
5. Research and development contracts	20	22,254	20	24,201	0	1,947
Subtotal, Extramural		$378,643		$406,270		$27,627
	FTEs		FTEs		FTEs	
6. Intramural Research	155	$74,901	157	$77,523	2	$113
7. Research Management and Support	92	31,299	95	32,405	3	-275
8. Construction		0		0		0
9. Buildings and Facilities		0		0		0
Subtotal, Program	247	$484,843	252	$516,197	5	$27,466
Total built-in and program changes						$31,354

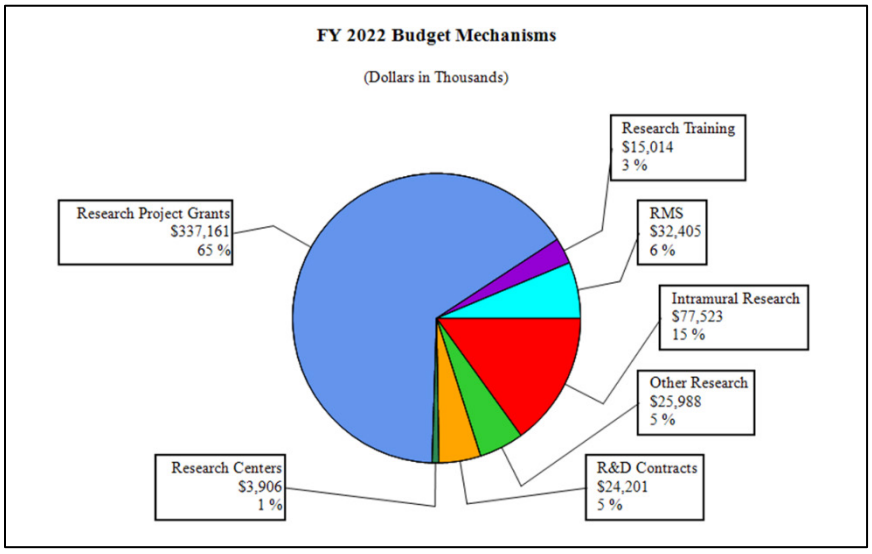
Fiscal Year 2022 Budget Graphs

History of Budget Authority and FTEs:

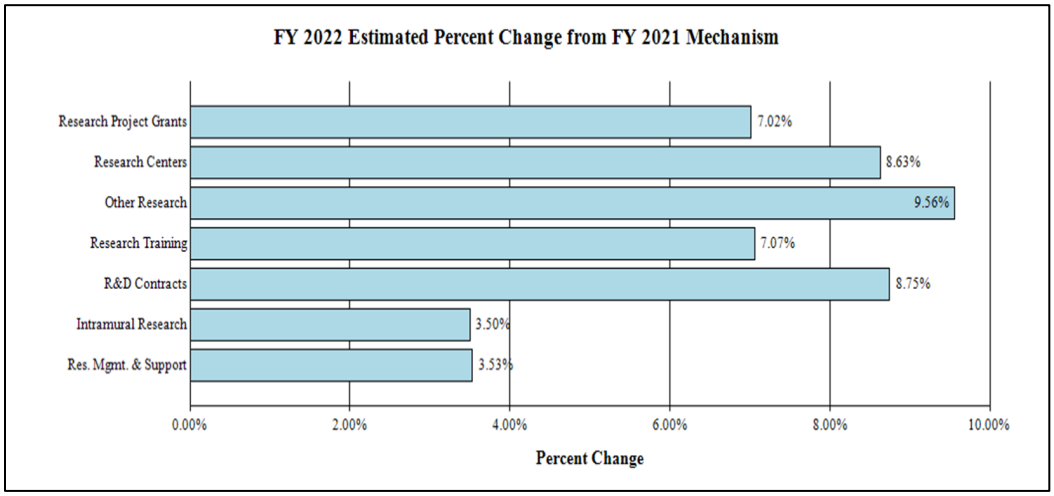




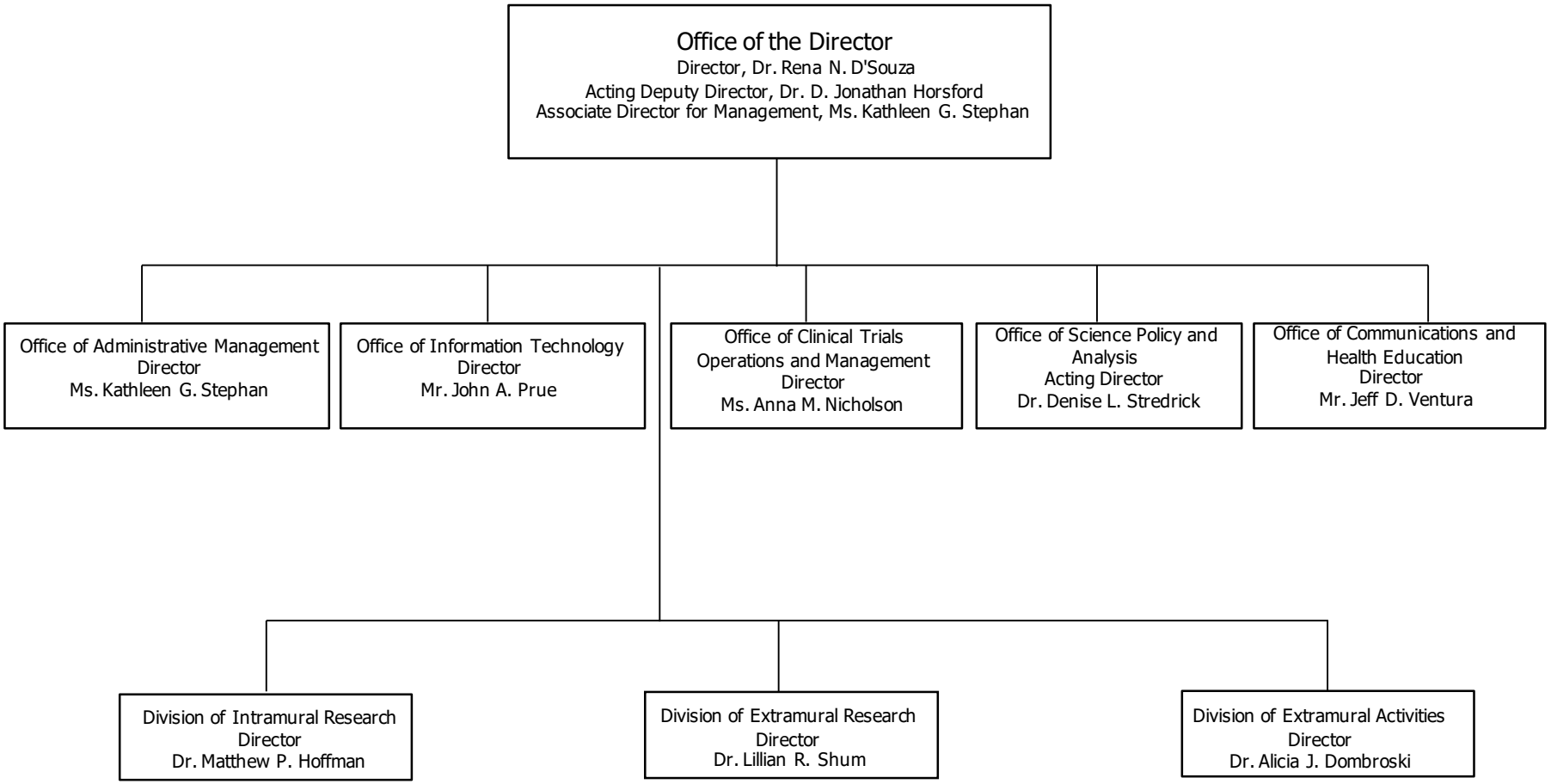
Distribution by Mechanism:



Change by Selected Mechanism:



National Institute of Dental and Craniofacial Research



NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Authority by Activity[1]

(Dollars in Thousands)

	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Building the foundation of knowledge for improving oral health		$188,667		$190,797		$204,718		$13,921
Translating research discoveries into diagnostics, therapies, and cures		39,923		40,374		43,320		2,946
Advancing clinical research to enhance health and reduce illness		121,803		123,178		132,165		8,987
Preparing the next generation of oral health researchers		24,023		24,294		26,066		1,773
Subtotal, Extramural		**$374,416**		**$378,643**		**$406,270**		**$27,627**
Intramural Research	**144**	**$72,826**	**155**	**$74,901**	**157**	**$77,523**	**2**	**$2,622**
Research Management & Support	**86**	**$30,437**	**92**	**$31,299**	**95**	**$32,405**	**3**	**$1,105**
TOTAL	**230**	**$477,679**	**247**	**$484,843**	**252**	**$516,197**	**5**	**$31,354**

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

Justification of Budget Request

National Institute of Dental and Craniofacial Research

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

Budget Authority (BA):

	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
BA	$477,679,000	484,843,000	516,197,000	+31,354,000
FTE	230	247	252	5

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

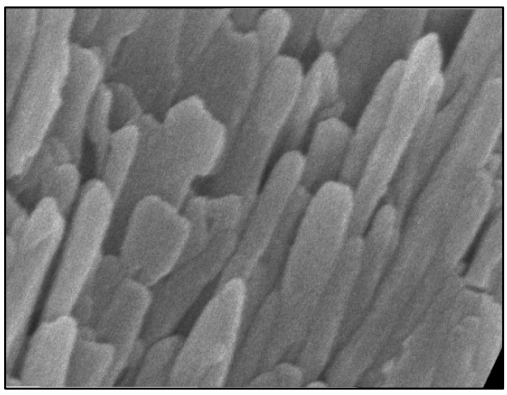
Program Descriptions and Accomplishments

NIDCR supports a comprehensive dental, oral, and craniofacial biology research and training portfolio that provides the scientific evidence for advancing prevention, diagnosis, and treatment of oral conditions and diseases. The narratives that follow highlight just some of the Institute's research areas, programs, and initiatives.

Building the foundation of knowledge for improving oral health

Basic science is an essential component of NIDCR's research priorities, generating the fundamental knowledge that serves as the foundation for biomedical advances. NIDCR's basic research ultimately enables development of improved dental restorative materials and novel oral biodevices; a better understanding of the genetics underlying dental, oral, and craniofacial diseases; insights into connections between oral health and overall health; advances in data collection and analysis; and multidisciplinary investigations into the transition from acute to chronic orofacial pain and overlapping pain conditions.

Atomic-level exploration of the teeth surface to learn new ways to prevent dental caries

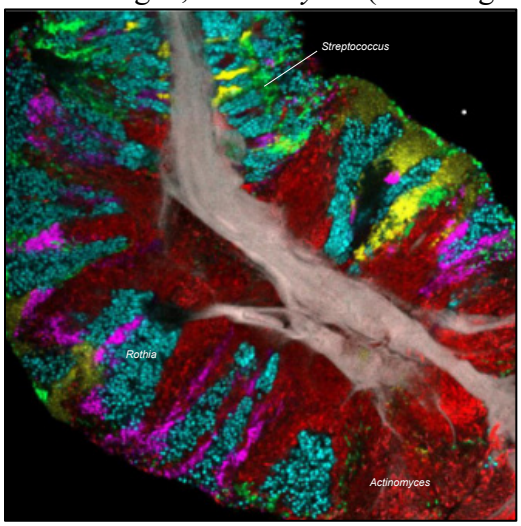


The outer layer of teeth, called enamel (figure to right), is the hardest substance in the human body, but it is not invincible. Bacteria that naturally live in the mouth feed on sugars and produce acid, which slowly dissolves away enamel and causes dental caries. Because enamel cannot repair itself after damage, scientists are studying the composition and structure of enamel to develop strategies to protect teeth from dental caries, and to make more durable and longer lasting materials to fill cavities. Until recently, it was not

possible to visualize enamel at ultra-high resolution because the high-energy electron beams produced by atomic-resolution microscopes damaged it. NIDCR-supported investigators used microscopes combined with chemical detection techniques to overcome this limitation and uncover the structural makeup of tooth enamel at never-before-achieved atomic resolution.[1] They found that enamel does not erode uniformly, and that the inside appears to degrade first. These results open up new research opportunities to strengthen enamel and repair damage.

New technology shows microbial villages and cities – inside your mouth

The oral microbiota – the collection of bacteria, viruses, and fungi that live in the mouth – is one of the largest and most varied microbial communities in the human body. It is also crucial for maintaining good oral and overall health. However, there is much we do not understand about this community of microorganisms, such as its complex structure. Using the latest imaging technology, one group of NIDCR-funded scientists found that the thin layer of microorganisms, called a biofilm, that lives on the tongue was highly organized, with clusters of similar bacteria dominating certain areas, as seen in the figure to the left. Of the many residential bacteria living on the tongue, *Actinomyces* (red in figure to left), *Rothia* (blue in figure), and *Streptococcus* (orange and green in figure) species were found in all healthy human samples tested, suggesting that they play an important role in the oral microbiota.[2] Another NIDCR-supported group used high-resolution imaging to track how oral microbial colonies multiply and spread on hard surfaces like teeth to form dental plaque. They observed growth patterns that mirror the growth of cities, with separated smaller village colonies growing and overlapping to form larger city colonies.[3] These unique perspectives of oral biofilm structure and growth can help investigators understand relationships between beneficial and harmful microbes, and facilitate strategies for maintaining oral health by inhibiting the growth of biofilms that cause dental caries and periodontal disease.



Budget Policy: The FY 2022 President's Budget estimate for this program is $204.7 million, an increase of $13.9 million or 7.3 percent compared to the FY 2021 Enacted level.

Translating research discoveries into diagnostics, therapies, and cures

NIDCR's translational research portfolio builds on our strong foundation of basic research to translate new knowledge into therapies and move discoveries more quickly into clinical trials and community studies to help patients with dental, oral, and craniofacial disease and conditions.

[1] www.pubmed.ncbi.nlm.nih.gov/32612224/
[2] www.pubmed.ncbi.nlm.nih.gov/32209464/
[3] www.pubmed.ncbi.nlm.nih.gov/32170131/

New insights into how brain perceives pain might lessen reliance on opioids

The ongoing opioid addiction epidemic remains a pressing public health crisis. To develop safer, non-addictive pain therapeutics that may one day eliminate the need for opioids, NIDCR, through the Helping to End Addiction Long-term Initiative[SM], funds research to uncover the biological mechanisms of pain. Scientists have discovered a novel pain-suppression pathway that underlies the pain-numbing properties of general anesthesia. Central to this pathway is the activation of nerve cells located in the amygdala, an area of the brain involved in pain processing. When the investigators specifically activated these amygdala nerve cells in laboratory mice, it led to decreased pain perception. Conversely, inhibiting these nerve cells led to a greater reaction to pain.[4] Further research on the activity of these pain-related nerve cells in the amygdala represents a promising potential target for novel, non-opioid chronic pain treatments that may one day help to reduce dependence on opioids.

On the front lines of oral cancer research

Over 50,000 people are diagnosed with oral cancers every year in the United States. A leading cause of these cancers is the rising infection rate of cancer-inducing oral human papillomavirus (HPV) – the same virus that causes cervical cancer. NIDCR leads the fight against oral cancers by supporting a broad research portfolio designed to tackle this challenge on several fronts: testing vaccines against oral HPV, detecting cancers early to increase treatment success, and finding treatments.

To prevent HPV-associated oral cancers, NIDCR-supported scientists are testing vaccines that protect against cancer-inducing oral HPV infection. HPV-associated cervical cancers vaccines are already available; however, scientists are not sure how well they protect against HPV-associated oral cancer. NIDCR-supported investigators showed in mice that an HPV vaccine they developed protected against numerous HPV types associated with 95 percent of cervical cancers and 99 percent of oral cancers. The next step is to test their vaccine in human trials.

To improve the detection and treatment of oral cancers, scientists leveraged the NIDCR-supported National Dental Practice-Based Research Network. This powerful network, including over 7,000 dental practitioners across the U.S., brings research to patients and practitioners in the real-world environment of dental practices. One study trained a small number of dentists to help screen for oral HPV infections and detect precancerous oral lesions. They found that dentists routinely identify these lesions and are therefore an important component in the frontline against oral cancer. Further, more people would benefit if additional dentists began screening for precancerous oral lesions and oral HPV infection.

To help those with a more advanced stage of oral cancer, which is often drug resistant, NIDCR-supported scientists are developing new treatments. For example, one group identified a specific HPV protein responsible for producing resistance to a type of immunotherapy. When they blocked this protein in an oral cancer mouse model using the FDA approved drug rimantadine, the tumors shrank in size and the mice lived longer than those not given rimantadine. The next step is to conduct human clinical trials testing rimantadine in combination with standard immunotherapy.

Growing bones in a lab may someday replace grafting

Bone defects, or missing bone, can be caused by traumatic injury, osteoporosis, or the removal of bone tumors. The standard treatment is a bone graft, which requires removing healthy bone from another part of the body to repair the damaged area. Because bone grafting is invasive and can cause complications like infections, bleeding, and nerve damage, a safer and more effective treatment is needed. NIDCR invests in a broad regenerative medicine portfolio to advance tissue engineering therapies to replace or regenerate damaged cells and tissues of the dental, oral, and craniofacial region, including bone. NIDCR-funded researchers discovered how to grow artificial bone in the lab, complete with living bone cells, nerve cells, and functioning blood vessels. This innovative bone-in-a-dish reproduces bone architecture down to a nanometer scale and can be

[4] www.pubmed.ncbi.nlm.nih.gov/32424286/

produced in 72 hours or less. Their discovery is already being used to study bone formation and evaluate drugs for stimulating bone growth.[5] In the future, lab-grown bone may replace bone grafts for treating bone defects. A second group of NIDCR-supported investigators invented a new technique to stimulate bone regeneration. They re-engineered liposomes, tiny spherical sacs that transport cargo within cells, to be more stable and carry a bone-building drug. Mice with bone injuries treated with the modified, drug-loaded liposome healed faster and more completely than untreated mice.[6] These translational research studies take us one step closer towards a future where bone injuries are healed using regenerative medicine therapies.

Budget Policy: The FY 2022 President's Budget estimate for this program is $43.3 million, an increase of $2.9 million or 7.3 percent compared to the FY 2021 Enacted level.

Advancing clinical research to enhance health and reduce illness

To complement investments in basic and translational research, NIDCR is committed to an extensive range of clinical research activities, including clinical trials, epidemiological studies, practice- and community-based research, and studies of oral health disparities.

Improving oral health of seniors and disabled people living in low-income community housing

Low-income older adults and adults with disabilities experience high rates of untreated dental caries and periodontal disease, which can lead to tooth loss and decreased quality of life, in addition to worsening other chronic health problems like heart disease and diabetes. Specific strategies to improve health behaviors have more of an effect when they occur at multiple levels in a person's life (home, work, community), not just in a physician's or dentist's office. Therefore, NIDCR-funded scientists are conducting a clinical trial within low-income housing communities for seniors and those with disabilities to test the effectiveness separately and together of two behavioral approaches.[7,8] The first is a set of resident-run oral health campaigns and the second is face-to-face counseling provided directly in the shared housing community. If successful, these methods could be easily implemented in a wider variety of residences and centers for seniors and those with disabilities and may improve poor oral health in these vulnerable populations.

[5] www.pubmed.ncbi.nlm.nih.gov/31388010/
[6] www.pubmed.ncbi.nlm.nih.gov/32494652/
[7] www.clinicaltrials.gov/ct2/show/NCT02419144
[8] www.pubmed.ncbi.nlm.nih.gov/31850853/

Using the science of surveys to prevent dental caries in underserved children

Dental caries is the most common chronic childhood disease and disproportionately affects children from low income households and racial and ethnic minorities, who often have less access to regular dental care. Untreated dental caries reduces quality of life by causing pain, tooth loss, difficulty eating, absence from school and work, and negative self-image, and the majority of the $124 billion the United States spends annually on dental care is for treating dental caries.[9] Increasing the delivery of preventative oral healthcare is a promising strategy for reducing disparities in dental caries among young, underserved children. NIDCR-funded investigators are taking advantage of an untapped opportunity to engage with primary medical care providers to help them identify those most at risk for dental caries and provide early interventions. They developed a practical and easily used questionnaire that identifies young children, especially those from diverse and underserved backgrounds, with the highest risk for developing dental caries.[10] Once the questionnaire is refined to be shorter and easily adaptable to different populations, it will have the potential to reduce the occurrence of dental caries, including in underserved populations at greatest risk. In addition to helping prevent dental caries by identifying those most at risk, their survey could serve as a model for researchers to adapt to help reduce the incidence of other preventable diseases and disorders.

Budget Policy: The FY 2022 President's Budget estimate for this program is $132.2 million, an increase of $9.0 million or 7.3 percent compared to the FY 2021 Enacted level.

Working to enhance understanding, diagnosis, and treatment of TMJDs

At least 10 million people in the United States are affected by temporomandibular joint disorders (TMJDs), a diverse, complex group of conditions that cause jaw joint and muscle dysfunction and pain. Testimonials such as "I struggle with intermittent pain in my ear canal, tooth pain, spasms in my face, and nerve and muscle pain from my eye down to the back of my neck" are not uncommon among individuals with these disorders.

TMJDs continue to confound medical and dental health care providers and researchers. In response, NIDCR and the NIH Office of the Director commissioned the National Academies of Science, Engineering, and Medicine (NASEM) to conduct a study addressing the state of TMJD research and care. The report, *Temporomandibular Disorders (TMD): Priorities for Research and Care*, identifies significant gaps in our understanding of TMJD and includes eleven recommendations, four of which pertain to research and building and sustaining a multidisciplinary TMJD research community. To focus on the research and training recommendations, NIDCR formed a TMJD Working Group, whose members come from several different NIH Institute, Center, and Office (ICO) Advisory Councils with relevant expertise and interests. The Working Group will use the NASEM report to help prioritize NIH and NIDCR's training and research strategies.

At the same time, NIDCR continues to invest in a broad array of basic, translational, and clinical TMJD research with the goal of improving the health and daily lives of people living with TMJDs. For example, NIDCR-funded investigators are using data science and machine learning to improve early diagnosis of TMJ osteoarthritis, a type of TMJD characterized by breakdown of the protective cartilage of the jaw joint that can lead to bone degeneration and pain and/or dysfunction in jaw movement. NIDCR also collaborates with other ICOs to advance the study of the transition from acute to chronic pain and to advance TMJD research and therapies through the Helping to End Addiction Long-term℠ Initiative. Additionally, in May 2020, NIDCR announced a planned initiative to study gene and protein expression in thousands of individual cells simultaneously to better understand the molecular mechanisms underpinning TMJD pain. These current and upcoming investigative efforts will enhance the understanding, diagnosis, and treatment of TMJDs.

[9] www.cdc.gov/oralhealth/conditions/index.html
[10] www.pubmed.ncbi.nlm.nih.gov/30205016/; www.clinicaltrials.gov/ct2/show/NCT01707797

Preparing the next generation of oral health researchers

NIDCR is dedicated to building an inclusive and diverse research community resulting in a vibrant scientific workforce equipped to meet the challenges of the future. These research training and career development programs target a wide range of scientific fields and career stages, incorporating interdisciplinary training and promotion of the dentist-scientist career paths. NIDCR supports both individual and institutional research training and career development awards, in addition to training within the NIDCR intramural program.

Training scientists to advance strategies to reverse periodontal disease

Supporting and nurturing the next generation of clinical researchers is crucial to ensuring that NIDCR continues to push the boundaries of oral health knowledge forward to develop new strategies to prevent, diagnose, and treat disease. To this end, NIDCR sponsors a diverse group of junior, dual-degree (MD-PhD and dental-PhD) trainees. These early career clinical scientists are already having an impact. For example, one NIDCR dentist-scientist is studying a potential treatment for age-associated periodontal disease, an infection of the tissues that surround the teeth and the number one cause of tooth loss in the elderly. Aging results in reduced function of the immune system, resulting in a decreased ability to protect against oral infections and an increased inflammatory response. Reducing inflammation, a known contributor of periodontal disease and other age-related diseases, could be the key to decreasing the occurrence of periodontal disease. The early career researcher treated elderly mice with an FDA-approved drug called rapamycin that has previously been shown to be effective in reversing aging. Short-term treatment with rapamycin reversed many of the signs of periodontal disease, including regeneration of the periodontal bone that holds the teeth in place. The drug also reduced markers of inflammation to levels seen in younger mice.[11] Since rapamycin is already FDA approved, a future clinical trial would test whether it also has protective effects in people with periodontal disease.

Early stage researcher studying fish to learn how to regrow teeth

Tooth loss is a global health problem that affects a person's ability to chew, smile, and speak, as well as their psychosocial wellbeing. Unfortunately, about 30 percent of people over 65 have none of their natural teeth. The ability to one day regenerate or repair our teeth would revolutionize dental care by minimizing or eliminating many of the costly and invasive traditional options for tooth replacement. Another NIDCR-funded dentist-scientist trainee studied tooth regeneration in fish in the hopes of using their research findings to help make new teeth or repair damaged ones in people. Since humans cannot grow new teeth, the researchers sought to understand the mechanisms of tooth replacement by studying the African cichlid fish (see accompanying figure) that replaces each tooth every few weeks. Unlike humans where our teeth and taste buds are located apart, in the

[11] www.pubmed.ncbi.nlm.nih.gov/32342860/

cichlid, teeth and taste buds overlap. This close proximity is because their teeth and taste buds grow from the same section of tissue.[12] Both cichlids and humans continuously regenerate taste buds, suggesting that if investigators could deduce how cichlid teeth regrow from taste bud precursor cells, that knowledge could someday be applied to similarly regrow human teeth using cells taken from our taste buds. The scientists found that a family of molecules called bone morphogenetic proteins were highly expressed in the replacement cichlid teeth, but were not present in the taste buds or other surrounding tissues. This deeper understanding of tooth development in fish may have potential for advancing new regenerative biology treatments and dental therapeutics in people with tooth loss.

Budget Policy: The FY 2022 President's Budget estimate for this program is $26.1 million, an increase of $1.8 million or 7.3 percent compared to the FY 2021 Enacted level.

Shedding light on rare diseases

NIDCR scientists are working to find the cause, treatment, and cure for many rare diseases, which often lack FDA approved treatments. Intramural and extramural researchers are collaborating to find novel therapies for the rare disease leukocyte adhesion deficiency type 1 (LAD1). LAD1 impairs the body's ability to protect itself from infections, so starting from birth, people with this disorder develop serious infectious conditions like periodontal disease, an infection of the tissues that secure your teeth. As a result, many children with LAD1 lose all their teeth before reaching adulthood. NIDCR intramural researchers treated a mouse model of LAD1 with a molecule that mimics the inflammation-reducing effects of immune cells, resulting in a healthy tissue environment with dramatically reduced inflammation and dramatically reduced loss of the bone that supports teeth.

NIDCR intramural investigators are also working to improve the diagnosis and clinical management of Loeys-Dietz Syndrome (LDS). LDS is a rare connective tissue disorder with five genetic subtypes. People with LDS often have dental hypersensitivity or TMJDs. After examining patients with each of the five LDS subtypes, NIDCR clinician scientists produced the first comprehensive description of the oral and dental anomalies in LDS patients. They established a novel classification system for the assessment of tooth defects associated with the syndrome and determined that the severity of the symptoms in individuals with LDS is subtype dependent. These results are informing new recommendations for diagnosing and treating people with LDS.

Intramural Program: interdisciplinary research synergy, from the bench to the bedside and back again

Scientists in NIDCR's intramural research division conduct cutting-edge basic, translational, and clinical dental, oral, and craniofacial research. Taking advantage of the NIH Clinical Center and collaborations with extramural investigators, intramural scientists study the biology of pain, itch, and taste; oral and craniofacial genetics and development; immunology of the mucosal system; salivary gland development and function; and stem cell biology and tissue regeneration. A cornerstone of the intramural program is a strong focus on training the next generation of researchers by recruiting highly talented trainees from all backgrounds.

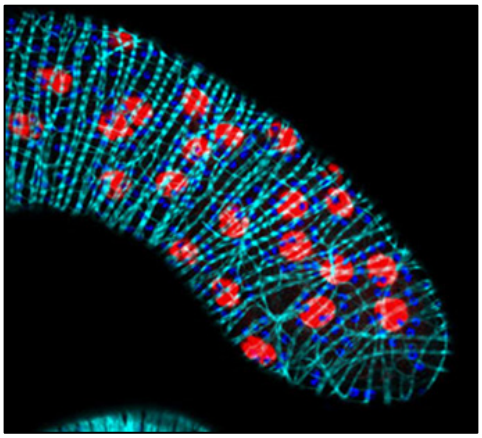
Potential treatment breakthrough for devasting autoimmune disease

NIDCR's intramural research program is studying the immune system's response to sarcoidosis, an inflammatory autoimmune disease that can have a destructive toll on many areas of the body, particularly the lymph nodes and lungs. Sarcoidosis is caused by excess production of inflammation-inducing chemical signals by immune cells called macrophages that cause the immune system to attack healthy tissues. NIDCR investigators are developing

[12] www.pubmed.ncbi.nlm.nih.gov/31427537/

approaches to treat sarcoidosis by using cells called mesenchymal stromal cells (MSCs). MSCs specifically target inflammation-inducing macrophages and transform them into macrophages that suppress inflammation. The researchers collected inflammation-inducing macrophages from the lungs of sarcoidosis patients and grew them together with MSCs. They found that the MSCs successfully converted the patients' macrophages to an anti-inflammatory state, suggesting that MSCs could potentially reduce inflammation in sarcoidosis patients.[13] Based on these promising results in cultured cells, MSCs or the chemical signals they produce could be tested in preclinical models as a treatment for sarcoidosis.

The role of tango -- in fruit flies!



When cells and organs secrete substances — saliva from the salivary gland or insulin from the pancreas — it is crucial that the precise amounts of the right proteins go to the proper location before they are secreted. Secretory failures can lead to diseases, such as diabetes if insulin is not secreted correctly, or dry mouth disorders if salivary glands do not secrete adequate amounts of saliva. To uncover the details of protein secretion, NIDCR intramural investigators studied different types of fruit fly glands and compartments within those cells known as secretory granules that store proteins destined for secretion. They established that secretory granule formation in several of the fly's glands requires a protein receptor called Tango1 located inside the cells. Using a high-resolution visualization technique, the scientists observed that in salivary glands Tango1 helps form a passageway between different parts of the cell, through which proteins are shuttled for packaging into secretory granules[14] – a necessary step for secretion. In the accompanying figure, large secretory granules are red, actin (a structural, scaffold-like protein) is light blue, and nuclei (the compartment that stores DNA) is dark blue. Since flies and humans share many aspects of basic cellular biology, these findings may shed light on the basic biology of human secretory gland function. Furthermore, increasing the foundation of knowledge through basic research could ultimately lead to treatments for salivary gland disorders and other secretory conditions.

Budget Policy: The FY 2022 President's Budget estimate for this program is $77.5 million, an increase of $2.6 million or 3.5 percent compared to the FY 2021 Enacted level.

Research Management and Support

NIDCR research management and support (RMS) personnel enable the success of all NIDCR-funded programs. The Institute uses a data-driven approach to decision-making, which improves administrative efficiency by streamlining and harmonizing RMS activities. RMS personnel serve as liaisons with grantees, provide stewardship for research training and career development

[13] www.pubmed.ncbi.nlm.nih.gov/31963936/
[14] www.pubmed.ncbi.nlm.nih.gov/31690624/

programs, analyze and advance science policy, coordinate program planning and evaluation, and lead stakeholder outreach and communications.

Budget Policy: The FY 2022 President's Budget estimate for this program is $32.4 million, an increase of $1.1 million or 3.5 percent compared to the FY 2021 Enacted level.

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2013	$408,212,000		$409,449,000	$410,710,288
Rescission				$821,421
Sequestration				($20,614,832)
2014	$411,515,000		$409,947,000	$398,650,000
Rescission				$0
2015	$397,131,000			$399,886,000
Rescission				$0
2016	$406,746,000	$404,847,000	$415,169,000	$415,582,000
Rescission				$0
2017[1]	$413,396,000	$425,578,000	$430,544,000	$425,751,000
Rescission				$0
2018	$320,749,000	$432,363,000	$439,738,000	$447,735,000
Rescission				$0
2019	$413,196,000	$453,082,000	$462,024,000	$461,781,000
Rescission				$0
2020	$397,493,000	$484,350,000	$486,756,000	$477,429,000
Rescission				$0
2021	$434,559,000	$481,535,000	$493,234,000	$484,867,000
Rescission				$0
2022	$516,197,000			

[1] Budget Estimate to Congress includes mandatory financing.

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2021 Amount Authorized	FY 2021 Enacted	2022 Amount Authorized	FY 2022 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$484,843,000	Indefinite	$516,197,000
National Institute of Dental and Craniofacial Research	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$484,843,000		$516,197,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Amounts Available for Obligation[1]

(Dollars in Thousands)

Source of Funding	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Appropriation	$477,429	$484,867	$516,197
Secretary's Transfer	0	0	0
OAR HIV/AIDS Transfers	250	-24	0
Subtotal, adjusted budget authority	$477,679	$484,843	$516,197
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	$477,679	$484,843	$516,197
Unobligated balance lapsing	-35	0	0
Total obligations	$477,644	$484,843	$516,197

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2020 - $3,112 FY 2021 - $4,000 FY 2022 - $4,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Authority by Object Class[1]

(Dollars in Thousands)

		FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021 Enacted
Total compensable workyears:				
	Full-time equivalent	247	252	5
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$201	$205	$4
	Average GM/GS grade	12.1	12.2	0.1
	Average GM/GS salary	$115	$117	$2
	Average salary, Commissioned Corps (42 U.S.C. 207)	$119	$121	$2
	Average salary of ungraded positions	$144	$147	$3
	OBJECT CLASSES	**FY 2021 Enacted**	**FY 2022 President's Budget**	**FY 2022 +/- FY 2021**
	Personnel Compensation			
11.1	Full-Time Permanent	16,832	17,414	582
11.3	Other Than Full-Time Permanent	11,753	12,161	407
11.5	Other Personnel Compensation	941	963	21
11.7	Military Personnel	140	144	4
11.8	Special Personnel Services Payments	3,497	3,577	80
11.9	**Subtotal Personnel Compensation**	**$33,165**	**$34,259**	**$1,094**
12.1	Civilian Personnel Benefits	11,104	11,823	720
12.2	Military Personnel Benefits	71	73	2
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$44,339**	**$46,155**	**$1,815**
21.0	Travel & Transportation of Persons	172	250	78
22.0	Transportation of Things	63	64	1
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Others	0	0	0
23.3	Communications, Utilities & Misc. Charges	191	195	3
24.0	Printing & Reproduction	3	3	0
25.1	Consulting Services	18,235	19,067	832
25.2	Other Services	9,078	9,118	41
25.3	Purchase of goods and services from government accounts	42,046	44,229	2,183
25.4	Operation & Maintenance of Facilities	171	171	0
25.5	R&D Contracts	6,225	6,540	314
25.6	Medical Care	210	218	8
25.7	Operation & Maintenance of Equipment	880	896	16
25.8	Subsistence & Support of Persons	0	0	0
25.0	**Subtotal Other Contractual Services**	**$76,844**	**$80,238**	**$3,394**
26.0	Supplies & Materials	3,593	3,657	65
31.0	Equipment	3,394	3,459	66
32.0	Land and Structures	105	106	2
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	356,139	382,069	25,929
42.0	Insurance Claims & Indemnities	0	0	0
43.0	Interest & Dividends	0	0	0
44.0	Refunds	0	0	0
	Subtotal Non-Pay Costs	**$440,504**	**$470,042**	**$29,539**
	Total Budget Authority by Object Class	**$484,843**	**$516,197**	**$31,354**

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

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
Personnel Compensation			
Full-Time Permanent (11.1)	$16,832	$17,414	$582
Other Than Full-Time Permanent (11.3)	11,753	12,161	407
Other Personnel Compensation (11.5)	941	963	21
Military Personnel (11.7)	140	144	4
Special Personnel Services Payments (11.8)	3,497	3,577	80
Subtotal Personnel Compensation (11.9)	**$33,165**	**$34,259**	**$1,094**
Civilian Personnel Benefits (12.1)	$11,104	$11,823	$720
Military Personnel Benefits (12.2)	71	73	2
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$44,339**	**$46,155**	**$1,815**
Travel & Transportation of Persons (21.0)	$172	$250	$78
Transportation of Things (22.0)	63	64	1
Rental Payments to Others (23.2)	0	0	0
Communications, Utilities & Misc. Charges (23.3)	191	195	3
Printing & Reproduction (24.0)	3	3	0
Other Contractual Services:			
Consultant Services (25.1)	18,235	19,067	832
Other Services (25.2)	9,078	9,118	41
Purchases from government accounts (25.3)	29,864	31,520	1,656
Operation & Maintenance of Facilities (25.4)	171	171	0
Operation & Maintenance of Equipment (25.7)	880	896	16
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$58,227**	**$60,772**	**$2,545**
Supplies & Materials (26.0)	$3,593	$3,657	$65
Subtotal Non-Pay Costs	**$62,249**	**$64,941**	**$2,693**
Total Administrative Costs	**$106,588**	**$111,096**	**$4,508**

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2020 Final			FY 2021 Enacted			FY 2022 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Extramural Activities									
Direct:	18	-	18	18	-	18	18	-	18
Reimbursable:	1	-	1	1	-	1	1	-	1
Total:	19	-	19	19	-	19	19	-	19
Division of Extramural Research									
Direct:	26	-	26	27	-	27	28	-	28
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	26	-	26	27	-	27	28	-	28
Division of Intramural Research									
Direct:	133	1	134	144	1	145	146	1	147
Reimbursable:	10	-	10	10	-	10	10	-	10
Total:	143	1	144	154	1	155	156	1	157
Office of Administrative Management									
Direct:	14	-	14	15	-	15	16	-	16
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	14	-	14	15	-	15	16	-	16
Office of Clinical Trial Operations and Management									
Direct:	2	-	2	2	-	2	2	-	2
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	2	-	2	2	-	2	2	-	2
Office of Communication and Health Education									
Direct:	6	-	6	7	-	7	7	-	7
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	6	-	6	7	-	7	7	-	7
Office of Information Technology									
Direct:	7	-	7	9	-	9	9	-	9
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	7	-	7	9	-	9	9	-	9
Office of Science Policy and Analysis									
Direct:	6	-	6	6	-	6	7	-	7
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	6	-	6	6	-	6	7	-	7
Office of the Director									
Direct:	6	-	6	7	-	7	7	-	7
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	6	-	6	7	-	7	7	-	7
Total	229	1	230	246	1	247	251	1	252
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
2018	11.8
2019	11.9
2020	12.1
2021	12.1
2022	12.2

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Positions[1]

GRADE	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	197,300	201,246	205,271
General Schedule			
GM/GS-15	12	14	15
GM/GS-14	27	29	29
GM/GS-13	41	43	44
GS-12	35	37	38
GS-11	12	14	15
GS-10	0	0	0
GS-9	8	11	12
GS-8	8	10	10
GS-7	5	7	7
GS-6	1	1	1
GS-5	1	1	1
GS-4	0	0	0
GS-3	1	1	1
GS-2	0	0	0
GS-1	0	0	0
Subtotal	151	168	173
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	1	1	1
Senior Grade	0	0	0
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	1	1	1
Ungraded	95	95	95
Total permanent positions	151	168	173
Total positions, end of year	248	265	270
Total full-time equivalent (FTE) employment, end of year	230	247	252
Average ES salary	197,300	201,246	205,271
Average GM/GS grade	12.1	12.1	12.2
Average GM/GS salary	112,651	114,904	117,202

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