National Institute of Dental and Craniofacial Research

CONGRESSIONAL JUSTIFICATION
FY 2023

Department of Health and Human Services
National Institutes of Health

NIH National Institute of Dental and Craniofacial Research

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DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of Dental and Craniofacial Research (NIDCR)

FY 2023 Budget Table of Contents

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Director's Overview

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

The mission of the National Institute of Dental and Craniofacial Research (NIDCR) is to advance fundamental knowledge about dental, oral, and craniofacial health and disease and translate these findings into prevention, early detection, and treatment strategies that improve overall health for all individuals and communities across the lifespan.

During this past year of the coronavirus disease 2019 (COVID-19) pandemic, NIDCR adopted a nimble and flexible approach, unleashing our staff's creativity and commitment to the extramural and intramural research we support. Harnessing the value of virtual platforms to unify our scientific communities, NIDCR launched several strategic initiatives to advance research in the oral health sciences, diversify and strengthen its biomedical and dental public health workforce, and create the evidence base needed to guide clinical practices that improve oral health for all.

FY 2021 ended with the announcement that one of the most vaunted honors in the world of biomedicine, the Nobel Prize in Physiology and Medicine, had been awarded to two NIDCR-supported scientists for "discoveries of receptors of temperature and touch." David Julius, Ph.D., and Ardem Patapoutian, Ph.D., have both been funded in part by NIDCR. Their discoveries add to fundamental knowledge about pain and proprioception, and offer opportunities to identify molecular targets for new pain therapies.

NIDCR's Response to COVID-19

NIDCR provided current extramural grantees with over $4 million in grant supplements to shift focus to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) research. These studies addressed the critical needs of patients as well as oral health practitioners, many of whom had to close their practices. Due to our many years of investment in research on salivary glands and diagnostics, NIDCR research had established that saliva is a biofluid that offers a wealth of information that can be used to detect SARS-CoV-2. Several studies were conducted through the National Dental Practice-Based Research Network (National Dental PBRN), a consortium of participating practices and dental organizations that has been funded by NIDCR since 2005 to give practitioners the opportunity to propose and participate in oral health research. Additionally, NIDCR administered six NIH Rapid Acceleration of Diagnostics Radical (RADx-rad) initiative grants focused on advancing early, non-traditional testing technologies, one of which successfully developed a 'smart mask' that changes colors when exposed to SARS-CoV-2-related proteins in saliva.

NIDCR intramural researchers also turned in new and unexpected directions. Previous research expertise in oral mucosal and salivary gland biology, combined with clinical trial experience, laid the groundwork for a rapid response to COVID-19. Clinical investigators at NIDCR quickly developed a protocol to examine the role of saliva in SARS-CoV-2 transmission and COVID-19 disease pathogenesis. By leveraging the NIH Clinical Center's telehealth services, staff

seamlessly continued NIDCR human subject studies and clinical care during the pandemic. Their studies showed for the first time that SARS-CoV-2 infects the cells of the oral cavity and salivary glands, indicating that the oral-gut axis is likely to play a role in disease transmission.[1,2]

Advances in Data Science

Multiple years of funding increases since 2015 have allowed NIDCR to build its data repository and cohort (registry) infrastructure in several disease and research areas to meet the increasing need for open-source data sharing. These include clinical registries and repositories related to head and neck cancers, orofacial birth defects and craniofacial anomalies, and craniofacial microsomia cohorts to identify genetic risk factors. Another cohort is seeking to identify risk factors for early childhood caries (ECC), or tooth decay, which is the most common chronic disease in children, and is characterized by marked social, economic, and racial disparities. FaceBase,[3] a central repository for craniofacial datasets and tools meant to advance craniofacial science, is now expanding to include data from deep phenotyping studies that correlate clinical features with single cell RNA analysis, the expression of genes and proteins, and potential molecular targets for therapeutics. NIDCR also continues to fund and expand the Human Oral Microbiome Database (eHOMD)[4] to give the scientific community comprehensive curated information on the bacterial species present in the oral cavity, pharynx, nasal passages, sinuses, and esophagus.

NIDCR recognizes that data repositories and databases require infrastructure dedicated to the collection, storage, retrieval, and analysis of massive amounts of biomedical data and information. The Institute will continue to increase its funding for these efforts, as well as its participation in trans-NIH and NIH Common Fund initiatives for data analysis and sharing.

The importance of multidisciplinary and team science

Orofacial clefts are the most common craniofacial birth defects. Over the course of many years of NIDCR-supported research on orofacial clefting, significant advances have been made on their causes, diagnosis, and treatment. Studying the genomes of people with and without orofacial clefting—coupled with bioinformatics analyses and cell culture and animal model experiments—has allowed researchers to uncover related genes. Further advances will likely involve multidisciplinary teams that bring distinct areas of expertise to the research endeavor. For example, recent collaborations between scientists at NIDCR with expertise in structural biology, combined with the genomic knowledge of a group at the National Genome Research Institute (NHGRI), identified the genetic mutations and biological mechanisms responsible for two previously unidentified disorders that involve craniofacial malformations. This collaboration will continue to be productive in identifying the genetic and biological underpinnings of syndromic diseases with dental, oral, and craniofacial (DOC) symptoms.

[1] pubmed.ncbi.nlm.nih.gov/33767405/
[2] www.nidcr.nih.gov/news-events/nidcr-news/2021/scientists-find-evidence-novel-coronavirus-infects-mouths-cells
[3] www.facebase.org/
[4] www.homd.org/

Temporomandibular disorders (TMDs) are a diverse, complex, and poorly understood group of conditions that cause pain and dysfunction in the jaw joint and supporting musculature. More than 36 million people, primarily women, are affected by TMD. A TMD Multi-Council Working Group was formed in early 2021, comprised of members of the National Advisory Dental and Craniofacial Research Council, and members of the councils of seven other NIH Institutes, Centers, and Offices (ICOs) with expertise and interests relevant to TMD research. The Group recommended an interdisciplinary patient-centered research consortium to advance TMD basic and applied research and its translation into evidence-based treatments that improve clinical care.

NIDCR's sustained efforts will reduce oral health inequities

Since the publication of NIDCR's *Strategic Plan to Reduce Racial and Ethnic Health Disparities* in 1999, considerable progress has been made to improve the oral health of Americans. Yet, there are still longstanding oral health inequities in disadvantaged and underserved communities. NIDCR funds several community-based and medical-dental partnerships currently testing additional interventions, including dental screening and preventive care in pediatric and primary medical settings, to remove barriers to care in a variety of underserved and vulnerable populations.

Moving forward, NIDCR will study oral diseases in the context of social, socio-economic, commercial, and environmental determinants of health. Regarding delivery of care, we now know the value of telehealth technologies to increase access to care. These technologies will receive further support and exploration.

Workforce diversity is a guiding principle for NIDCR

NIDCR is committed to developing a research workforce that represents the nation's demographics across all aspects of race, ethnicity, gender/sexual identity, disability, socioeconomic status, and life experiences. We continually strive to improve and strengthen racial equity, diversity, and inclusion across all facets of the biomedical research enterprise.

Diversity, equity, and inclusion (DEI) is especially pertinent to NIDCR because Black, American Indian/Alaska Native, Asian-American and Pacific Islander, Hispanic, and women applicants are significantly underrepresented amongst our grantees. An NIDCR-led taskforce has developed mechanisms to increase participation of underrepresented individuals at every level of the dental, oral, and craniofacial biomedical research pipeline. These include implementing a strategic framework to advance DEI in the DOC research workforce, an assessment of the successes and failures of past initiatives, and the formulation of a data-driven action plan to keep abreast of trans-NIH DEI initiatives.

Measuring success

In 2021, NIDCR implemented a new funding strategy to re-assess the level of additional funding awarded to well-resourced investigators so that additional budget reductions could be redirected more broadly to diversify our portfolio. NIDCR is also using high program priority (HPP)

funding strategies to ensure adequate support of early-stage investigators and at-risk researchers, and to sustain scientists across career stages. HPP strategies have broadened the research portfolio with a particular focus on balancing diverse perspectives, soliciting unique research opportunities, and attracting new researchers into our portfolios.

The NIDCR strategic plan 2021-26 and the Oral Health in America report

Throughout 2021, NIDCR engaged its executive leaders, intramural and extramural researchers, members of the National Advisory Dental and Craniofacial Research Council, and diverse stakeholders in developing a new Strategic Plan. The foundation of the NIDCR 2021-26 Strategic Plan is expressed in five Strategic Priorities that encompass the entire translational research spectrum of foundational/basic, pre-clinical, and clinical research; implementation sciences; and public health research. Emphasis is placed on training a diverse and skilled research workforce, and furthering collaborations across NIH and with DOC stakeholders. Upon implementation, specific metrics will measure the success of initiatives, while communicating progress as goals are achieved.

After several years of development, and with extensive input from over 400 contributors, in December of 2021 NIDCR released *Oral Health in America: Advances and Challenges*, a data-driven report that examines 20 years of progress in oral health since the 2000 Surgeon General's Report on Oral Health. Looking at the current status, future opportunities, and new obstacles to overcome in the context of today's societal challenges, the Report provides a framework to energize an era of science and technology applications, while improving the oral and overall health of individuals, families and their communities.

Looking towards the future

In November of 2021 NIDCR's Office of the Director welcomed a new Deputy Director, Jennifer Webster-Cyriaque, D.D.S., Ph.D. As a viral pathologist and oral medicine expert, Dr. Webster-Cyriaque brings a breadth of experiences to NIDCR. She is a devoted mentor and has a special interest in advancing NIDCR's clinical and translational research programs. Her research laboratory, focused on HIV-related research, will be hosted by Dr. Jeffrey Cohen, National Institute of Allergy and Infectious Diseases (NIAID). Renée W. Joskow, D.D.S., M.P.H., F.A.G.D., F.A.C.D., F.I.C.D., Captain – U.S. Public Health Service and Chief Dental Officer at the Health Services and Resources Administration, joined NIDCR in late October. She is a Diplomate of the American Board of Dental Public Health and has extensive expertise in the oral health sciences, science policy, and analysis, and has built many collaborations with federal agencies and various stakeholder organizations. Working with other executive team leaders, Drs. Webster-Cyriqaue and Joskow will contribute significantly to fulfilling NIDCR's mission and objectives.

NIDCR's three-year Dental Public Health Residency and Fellowship program will train two talented individuals per year who are dedicated to pursuing a career in dental public health research. Opportunities abound for trainees to engage in cutting-edge population health sciences research across NIH. In the next year, focus group discussions will be held among NIDCR and NIH experts and thought leaders from the extramural sector. Priority areas to advance

strategically include but are not limited to: Temporomandibular dysfunction, Human Papiloma Virus-positive oropharyngeal cancers, the autoimmune disease Sjögren's syndrome, and probiotics and anti-caries agents. Taken together, these efforts will advance a better understanding of DOC diseases and disorders and will forge new pathways of discovery science and applications for cures and therapies.

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National Institute of Dental and Craniofacial Research

Fact Sheet

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 scientific workforce;*
- *Communicating new scientific knowledge to the public, health professionals, researchers, and policymakers.*

NIDCR is building on its foundation of basic and translational oral health research to eliminate health disparities and address public health challenges such as COVID-19, opioid use and pain, temporomandibular disorders (TMDs), and human papillomavirus (HPV)-positive oral cancers.

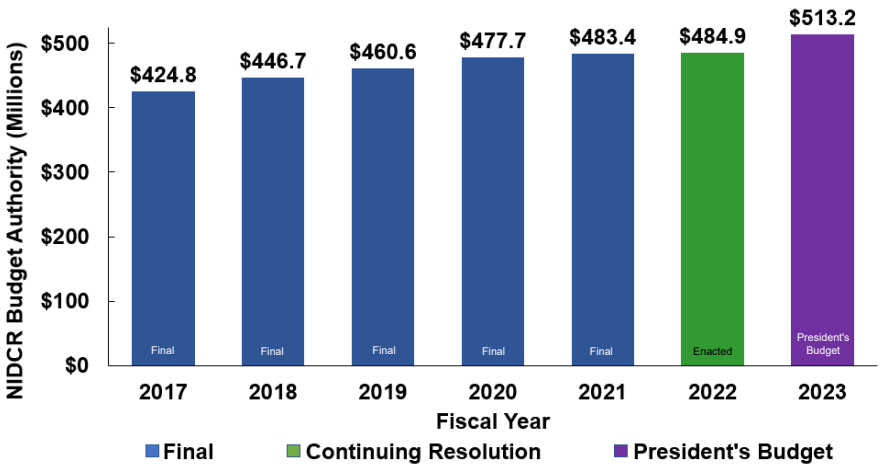
NIDCR Director Dr. Rena D'Souza is a dentist and well-established researcher in the fields of craniofacial and tooth development, genetics, and regenerative dental medicine.

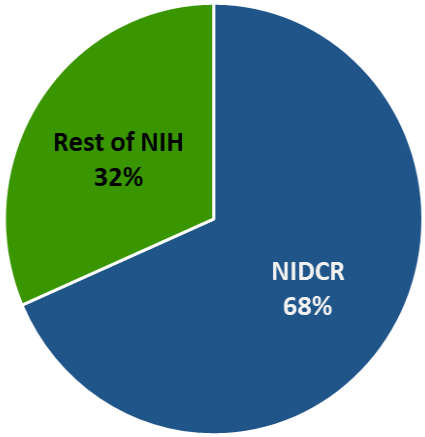
Research Highlights

- Discovered that SARS-CoV-2 infects the mouth.
- Funded research to develop new COVID-19 diagnostic tools.
- Developed a new technology to treat nerve injuries that restores movement and sensation in patients.
- Built a tool that uses artificial intelligence (AI) to aid diagnoses of rare genetic diseases in children.
- Launched an ongoing clinical trial of a gene therapy 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.
- Demonstrated the feasibility and promise of using text messages to improve oral health behaviors and reduce health disparities in underserved children.

NIDCR Facts

- *Largest funder of oral health research in the world*
- *Research funded by NIDCR provides evidence base for oral health care practices of 200,000 U.S. dental practitioners*
- *Accounts for 68% of all NIH funding to U.S. dental schools and supports 78% of all NIH awardees with dental oral health-related degrees*



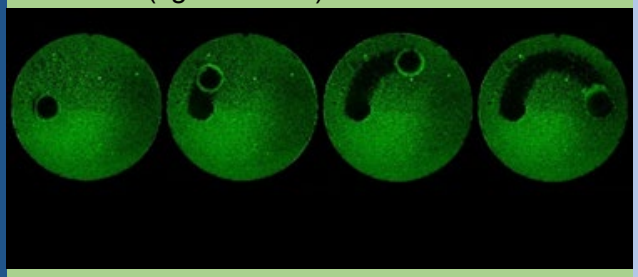


NIH Funding to U.S. Dental Schools

National Institute of Dental and Craniofacial Research

Major Accomplishments

- Supported creation of the Human Oral Microbiome Database, which continues to provide 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 bacterial biofilms, like dental plaque, from surfaces. This technology could provide a new method of removing biofilms from teeth, medical implants, and medical devices (figure below).



- Leveraged the NIDCR-funded National Dental Practice Based Research Network, which includes more than 7,000 practitioners and 60,000 participants across all 50 states, to generate evidence-based approaches to safely treat patients during the COVID-19 pandemic.

Current Activities

- Immediate-impact research to reduce SARS-CoV-2 transmission risk in dental practices, including a study to determine viral load in oral secretions and a project to reduce aerosols during dental procedures.
- Support development of a handheld device for rapid detection of coronavirus and a “smart mask” that changes color in presence of SARS-CoV-2.
- Development of *Oral Health in America: Advances and Challenges*, a report that serves as a call to action for a coordinated effort among oral health practitioners; researchers; and other stakeholders to improve oral health for all Americans.
- Establishment of the new NIDCR-wide strategic plan to guide research planning over the next five years.
- Sponsors the Oral Health Disparities and Inequities Research Consortium to eliminate inequities in oral health and expand access to dental care in vulnerable populations.
- Support of 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 non-addictive pain interventions to address the opioid epidemic.

Dental Public Health Research Residency

- NIDCR is launching a three-year dental public health (DPH) residency and fellowship program.
- The first year focuses on DPH curriculum for board certification, followed by two years of postdoctoral research training.
- The program provides a collaborative experience leveraging the resources of NIH, federal agencies, and local institutions.

Future Initiatives

- Continuing to support research on SARS-CoV-2 oral transmission and COVID-19 diagnostics, including development of oral biosensors to detect viral biomolecular signatures.
- Establishing a new research initiative to create a more equitable and inclusive dental, oral, and craniofacial research enterprise.
- Addressing oral health disparities through research to understand how social determinants of health, such as availability of healthy foods or reliable transportation, affect oral health and access to dental care.
- Establishing a dual degree dentist-scientist transition award to support advancement of promising, early stage researchers with dental degrees from pre- to post- doctoral training.

Major Changes in the Budget Request

Major changes by budget mechanism and/or budget detail are briefly described below. The FY 2023 President's Budget for NIDCR is $513.2 million, an increase of $28.3 million from the FY 2022 Continuing Resolution (CR) level.

Research Project Grants (+$23.3 million; total $337.0 million):
NIDCR will support a total of 732 Research Project Grant (RPG) awards in FY 2023. Noncompeting RPGs will increase by 8 awards and $4.9 million relative to the FY 2022 CR level. Competing RPGs will increase by 43 awards and $17.5 million.

Other Research (+$0.5 million; total $25.8 million):
NIDCR will increase funding by 2.0 percent for Other Research relative to the FY 2022 CR level, with three additional Research Careers awards.

Research Training (+$0.7 million; total $14.2 million):
NIDCR will increase funding by 5.0 percent for Research Training relative to the FY 2022 CR level, including an increase of 8 full-time training positions (FTTPs).

Budget Mechanism Table

NATIONAL INSTITUTES OF HEALTH

National Institute of Dental and Craniofacial Research

Budget Mechanism *

(Dollars in Thousands)

Mechanism	FY 2021 Final		FY 2022 CR		FY 2023 President's Budget		FY 2023 +/- FY 2022	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Research Projects:								
Noncompeting	456	$212,116	493	$227,763	501	$232,699	8	$4,936
Administrative Supplements	*(37)*	$4,565	*(37)*	$4,565	*(37)*	$4,565	*(0)*	$0
Competing:								
Renewal	25	$14,189	15	$8,721	19	$10,968	4	$2,247
New	171	$65,978	153	$59,107	192	$74,337	39	$15,230
Supplements	2	$2,749	0	$0	0	$0	0	$0
Subtotal, Competing	**198**	**$82,916**	**168**	**$67,828**	**211**	**$85,305**	**43**	**$17,477**
Subtotal, RPGs	654	$299,597	661	$300,156	712	$322,569	51	$22,413
SBIR/STTR	19	$13,500	19	$13,550	20	$14,470	1	$920
Research Project Grants	673	$313,096	680	$313,705	732	$337,039	52	$23,334
Research Centers								
Specialized/Comprehensive	1	$3,933	1	$3,836	1	$3,920	0	$84
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	**1**	**$3,933**	**1**	**$3,836**	**1**	**$3,920**	**0**	**$84**
Other Research:								
Research Careers	66	$9,670	69	$10,153	72	$10,661	3	$508
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	$333	0	$0	0	$109	0	$109
Other	23	$15,017	24	$15,104	24	$14,995	0	-$109
Other Research	**89**	**$25,019**	**93**	**$25,257**	**96**	**$25,765**	**3**	**$508**
Total Research Grants	763	$342,049	774	$342,798	829	$366,723	55	$23,925
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	118	$5,445	117	$5,554	122	$5,832	5	$278
Institutional Awards	125	$7,497	124	$7,957	127	$8,355	3	$398
Total Research Training	**243**	**$12,943**	**241**	**$13,512**	**249**	**$14,187**	**8**	**$676**
Research & Develop. Contracts	19	$22,201	19	$22,445	19	$23,415	0	$970
SBIR/STTR (non-add)	*(0)*	*($142)*	*(0)*	*($0)*	*(0)*	*($150)*	*(0)*	*($150)*
Intramural Research	150	$74,901	154	$74,292	154	$76,091	0	$1,799
Res. Management & Support	91	$31,293	98	$31,821	98	$32,775	0	$953
SBIR Admin. (non-add)	*(0)*	*($4)*	*(0)*	*($5)*	*(0)*	*($10)*	*(0)*	*($5)*
Construction		$0		$0		$0		$0
Buildings and Facilities		$0		$0		$0		$0
Total, NIDCR	**241**	**$483,387**	**252**	**$484,867**	**252**	**$513,191**	**0**	**$28,324**

* All items in italics and brackets are non-add entries.

Appropriations Language

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, $513,191,000.

Summary of Changes

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Summary of Changes
(Dollars in Thousands)

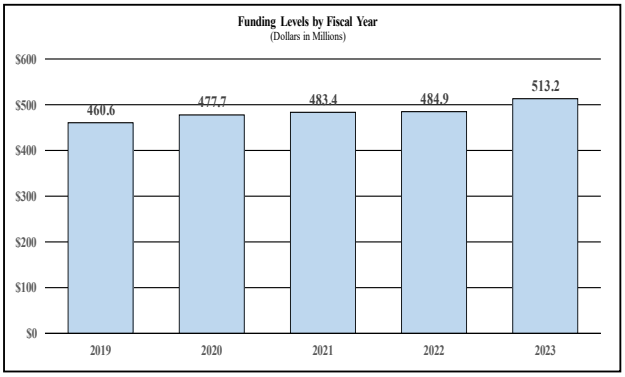
FY 2022 CR	$484,867
FY 2023 President's Budget	$513,191
Net change	$28,324

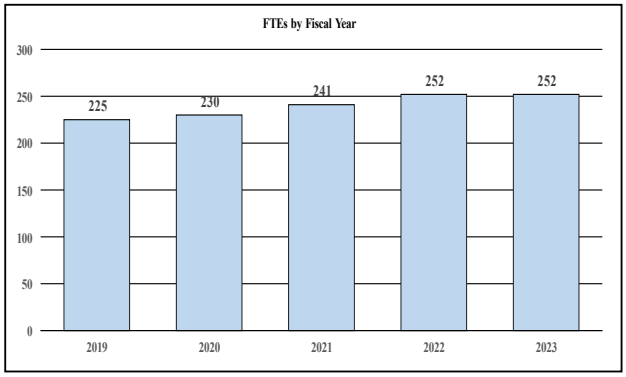
CHANGES	FY 2022 CR FTEs	FY 2022 CR Budget Authority	FY 2023 President's Budget FTEs	FY 2023 President's Budget Budget Authority	Built-In Change from FY 2022 CR FTEs	Built-In Change from FY 2022 CR Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of January 2022 pay increase & benefits		$29,509		$30,590		$196
b. January FY 2023 pay increase & benefits		$29,509		$30,590		$999
c. Paid days adjustment		$29,509		$30,590		-$112
d. Differences attributable to change in FTE		$29,509		$30,590		$0
e. Payment for centrally furnished services		$12,771		$13,026		$255
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$32,012		$32,475		$709
Subtotal						$2,046
2. Research Management and Support:						
a. Annualization of January 2022 pay increase & benefits		$17,098		$17,724		$113
b. January FY 2023 pay increase & benefits		$17,098		$17,724		$578
c. Paid days adjustment		$17,098		$17,724		-$65
d. Differences attributable to change in FTE		$17,098		$17,724		$0
e. Payment for centrally furnished services		$2,341		$2,388		$47
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$12,382		$12,663		$272
Subtotal						$945
Subtotal, Built-in						$2,991

CHANGES	FY 2022 CR No.	FY 2022 CR Amount	FY 2023 President's Budget No.	FY 2023 President's Budget Amount	Program Change from FY 2022 CR No.	Program Change from FY 2022 CR Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	493	$232,328	501	$237,264	8	$4,936
b. Competing	168	$67,828	211	$85,305	43	$17,477
c. SBIR/STTR	19	$13,550	20	$14,470	1	$920
Subtotal, RPGs	680	$313,705	732	$337,039	52	$23,334
2. Research Centers	1	$3,836	1	$3,920	0	$84
3. Other Research	93	$25,257	96	$25,765	3	$508
4. Research Training	241	$13,512	249	$14,187	8	$676
5. Research and development contracts	19	$22,445	19	$23,415	0	$970
Subtotal, Extramural		$378,754		$404,325		$25,571
6. Intramural Research	154	$74,292	154	$76,091	0	-$247
7. Research Management and Support	98	$31,821	98	$32,775	0	$8
8. Construction		$0		$0		$0
9. Buildings and Facilities		$0		$0		$0
Subtotal, Program	252	$484,867	252	$513,191	0	$25,333
Total built-in and program changes						$28,324

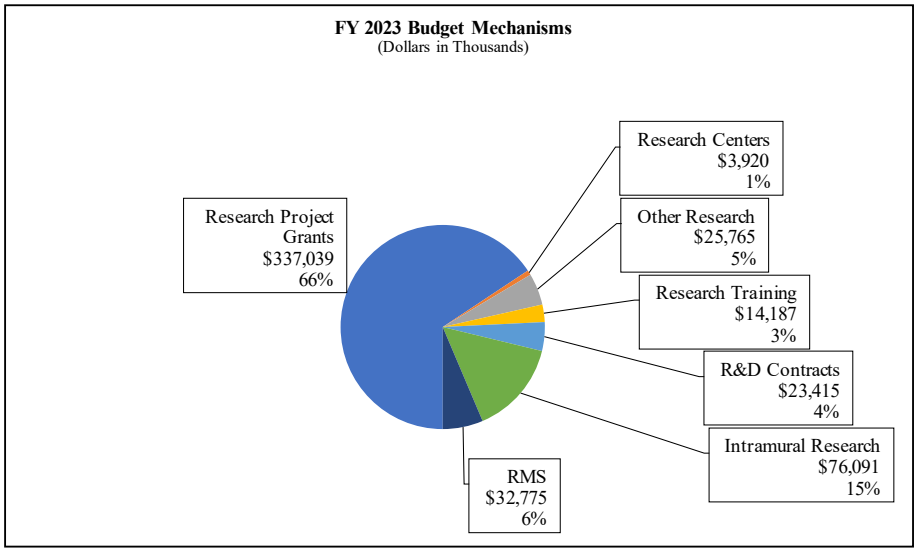
Budget Graphs

History of Budget Authority and FTEs:

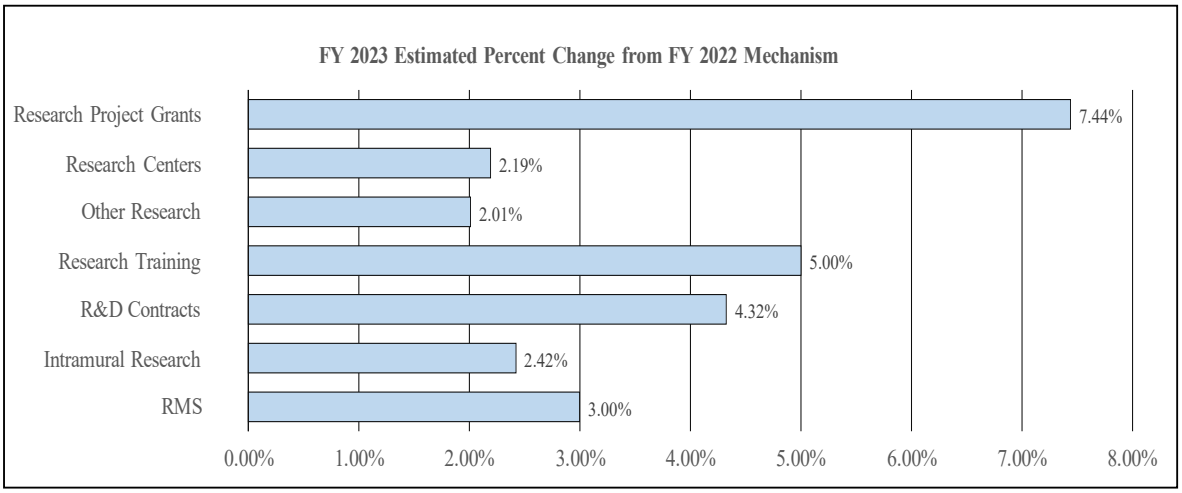




Distribution by Mechanism:

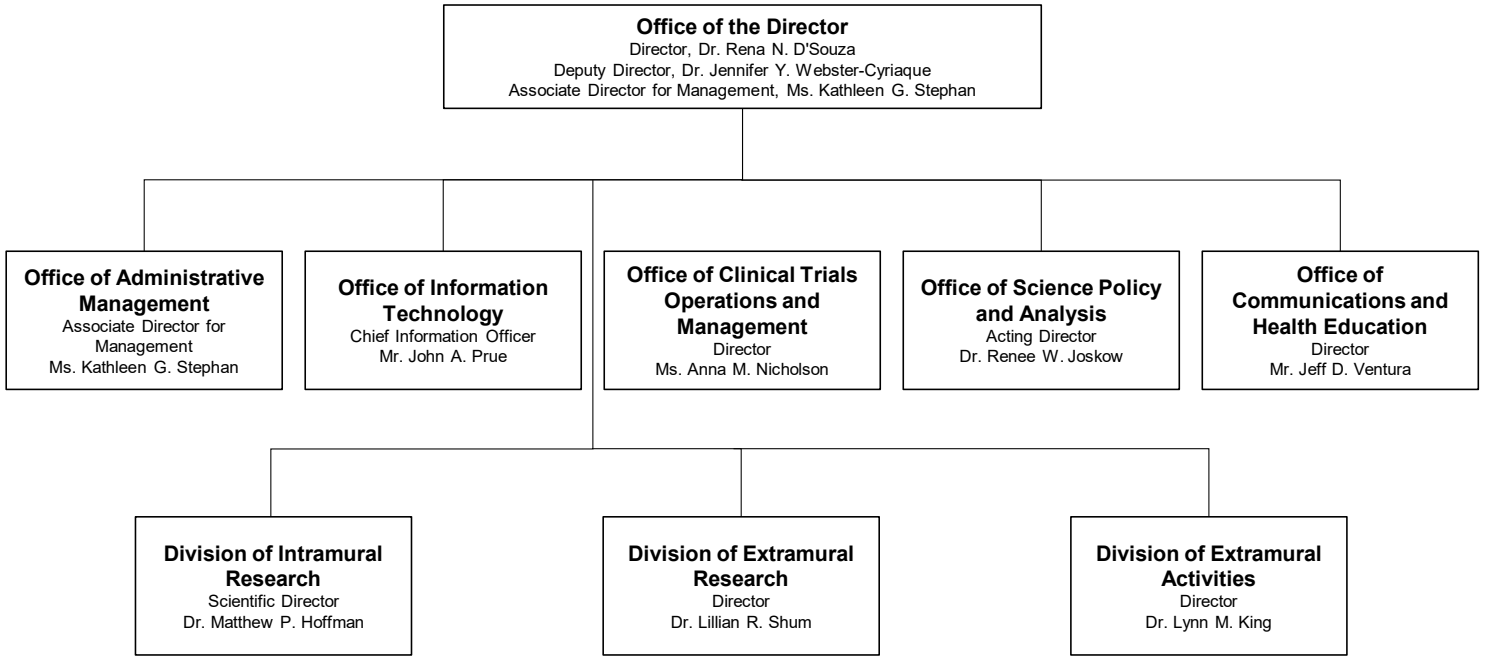


Change by Selected Mechanisms:



Organization Chart

National Institute of Dental and Craniofacial Research



Budget Authority by Activity Table

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Authority by Activity *
(Dollars in Thousands)

	FY 2021 Final		FY 2022 CR		FY 2023 President's Budget		FY 2023 +/- FY 2022 CR	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Building the foundation of knowledge for improving oral health		$183,223		$183,982		$196,403		$12,421
Translating research discoveries into diagnostics, therapies, and cures		$43,252		$43,431		$46,363		$2,932
Advancing clinical research to enhance health and reduce illness		$125,982		$126,503		$135,044		$8,541
Preparing the next generation of oral health researchers		$24,736		$24,838		$26,515		$1,677
Subtotal, Extramural		**$377,193**		**$378,754**		**$404,325**		**$25,571**
Intramural Research	**150**	**$74,901**	**154**	**$74,292**	**154**	**$76,091**	**0**	**$1,799**
Research Management & Support	**91**	**$31,293**	**98**	**$31,821**	**98**	**$32,775**	**0**	**$953**
TOTAL	**241**	**$483,387**	**252**	**$484,867**	**252**	**$513,191**	**0**	**$28,324**

* 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 2021 Final	FY 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022 CR
BA	$483,387,000	$484,867,000	$513,191,000	+$28,324,000
FTE	241	252	252	0

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

Overall Budget Policy: The FY 2023 President's Budget request for NIDCR is $513.2 million, an increase of $28.3 million or 5.8 percent compared with the FY 2022 CR level. This increase will allow NIDCR to maximize efforts to enhance the diversity of the dental, oral, and craniofacial (DOC) biomedical research workforce by identifying key barriers to success and fostering pathways to increase the participation of underrepresented groups in DOC research. The increase includes $18.0 million targeted to enhance pain research across the NIDCR portfolio, as part of an NIH-wide initiative to increase research into opioids and pain management.

Program Descriptions and Accomplishments

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

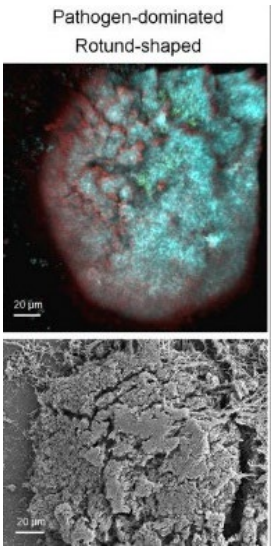
Building the foundation of knowledge for improving oral health

Basic science is an essential component of NIDCR's research priorities because it generates fundamental knowledge that serves as the foundation for biomedical and behavioral advances. NIDCR's support of basic research helps foster 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; the development of improved dental restorative

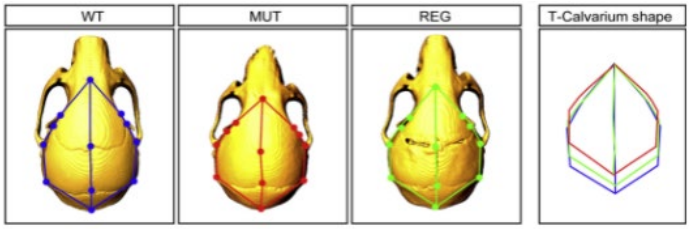
materials and novel oral biodevices; and multidisciplinary investigations into the transition from acute to chronic orofacial pain and overlapping pain conditions.

Shedding light on the shape of caries-causing biofilms

Despite being highly preventable, dental caries (tooth decay) is the most common chronic disease. Caries is caused by biofilm, a layer of bacteria that forms on teeth and shields bacteria from antibiotics, making treatment difficult. Although many of the bacteria found in biofilm are not harmful, some are known to cause caries. *Mutans streptococci* are most responsible for caries, with *Streptococcus mutans (S. mutans)* being the most prominent. NIDCR-funded investigators analyzed intact biofilms on teeth from toddlers with caries. Using cutting-edge laser scanning and fluorescence microscopy to visualize biofilm structure in detail, the researchers discovered a unique, three-dimensional biofilm architecture called "rotund" *(Figure, left)*. The structure was comprised of an *S. mutans* inner core surrounded by precisely arranged layers of other bacterial species, and it contained a much higher percentage of *S. mutans* than other common biofilm structures. The scientists concluded that the layers serve as a protective barrier that creates an optimal environment for bacteria to thrive, allowing the biofilm to perpetuate its damaging effects on tooth enamel.[5] This insight into the architecture of dental biofilm may lead to novel ways of preventing and treating caries.



Using stem cells to restore skull shape and brain function in mice



NIDCR-funded investigators used stem cells to correct skull shape and reverse learning and memory deficits in young mice with craniosynostosis. Craniosynostosis is a disorder in which the fibrous joints that separate an infant's skull bones, called sutures, fuse into bone before the brain is fully formed. As a result, the skull grows abnormally, which can lead to developmental delays and learning deficits. Scientists wanted to know if restoring normal skull development could improve neurocognitive function in mice. They showed that, like humans, mice with craniosynostosis have increased pressure inside their skulls and perform poorly on tests of social and spatial memory.[6] The researchers prepared a biodegradable gel infused with a type of stem cells called $Gli1^+$ cells and surgically implanted the mixture into the skulls of young mice with craniosynostosis. The surgery restored sutures and partially corrected skull shape (*Figure, right*, "REG"). It also reduced internal skull pressure and improved spatial memory and motor learning. Next steps include determining the optimal timing of the surgery and the ideal type and number of stem cells to implant. This study provides a foundation for developing a

[5] pubmed.ncbi.nlm.nih.gov/32424080/
[6] pubmed.ncbi.nlm.nih.gov/33417861/

stem-cell based therapy for craniosynostosis.

Limiting the effects of temporomandibular joint osteoarthritis

Temporomandibular disorders (TMDs) are a diverse, complex, and poorly understood group of conditions that cause pain and dysfunction in the jaw joint and muscles. One common TMD is temporomandibular joint (TMJ) osteoarthritis (OA), a degenerative disease characterized by the wearing down of cartilage in the jaw. Currently, there are no approved therapies for this condition, which affects women at a higher rate than men. Studies have shown that a protein called LOXL2 reduces inflammation and protects TMJ cartilage in mice. Based on this knowledge, NIDCR-supported researchers used gene therapy to deliver the *LOXL2* gene directly into the TMJ cartilage of mice. The treatment led to increased expression of genes involved in protecting the joint by preventing cartilage loss and increasing cartilage regeneration.[7] Certain genes were expressed differently in female mice compared to males. These findings suggest that *LOXL2* gene therapy could hold promise for preventing and treating TMJ OA, and that it may be possible to target OA in a gender-specific manner.

Budget Policy: The FY 2023 President's Budget estimate for this program is $196.4 million, an increase of $12.4 million or 6.8 percent compared to the FY 2022 CR level.

Translating research discoveries into diagnostics, therapies, and cures

NIDCR's translational research portfolio builds on a strong foundation of basic research to translate new knowledge into therapies for dental, oral, and craniofacial diseases and conditions.

Combining AI and Genetics to Improve Understanding of Craniofacial Development

Craniofacial dysmorphism—abnormal development of the skull and facial structures—can be a feature of many types of disorders. NIDCR supports research to improve diagnosis and treatment of these disorders, starting with basic and translational studies to understand normal craniofacial development.

NIDCR-funded investigators led a team of international scientists created a genetic map of the human face. Using 3D facial photographs and DNA samples from more than 8,000 people, the team identified over 200 segments of DNA associated with normal development of specific areas of the face. Approximately 50 of the DNA segments were not previously known to be involved in facial development. Many of the identified genes have also been linked to syndromes that affect the face. These findings may offer valuable insights into craniofacial development and the evolutionary origins of human face shape and may one day help with the diagnosis of diseases with distinct facial features as well as aid in forensic reconstruction.

Recent developments in bioinformatics, image processing, and artificial intelligence/machine learning (AI/ML) are making it possible to use facial feature data to help diagnose craniofacial diseases. However, many of these tools are not broadly available to clinicians or researchers. NIDCR-funded researchers have now overcome this barrier by creating an open-source collection of age- and sex-specific 3D craniofacial growth curves. The scientists demonstrated that the growth curves can be used to identify normal and disordered facial features in patients, independent of age-specific facial development. The collection, which is integrated with custom-built software, can be used by scientists to better understand diseases and by clinicians to support diagnoses, without requiring the expertise of computer scientists or engineers.

These findings, in combination with the use of non-invasive and AI-amenable imaging techniques for diagnoses of syndromes, bring new hope for quicker diagnoses of rare diseases.

[7] pubmed.ncbi.nlm.nih.gov/33214607/

Working toward healing wounds without scarring

Many people have at some point gotten a cut or wound that, after healing, developed into a scar. Fibrotic scarring is the mechanism by which wounds typically heal in humans and other mammals. However, scar formation weakens tissue and reduces its flexibility, which can lead to disfigurement and loss of function. But what if there was a way to heal wounds while avoiding scarring altogether? To answer this question, a group of NIDCR-supported investigators explored how cells called fibroblasts help control scar formation. The researchers discovered that after an injury, a subset of fibroblasts begin to express a gene called engrailed-1 (*EN1*), ultimately leading to scar formation. When *EN1* is suppressed in these cells, a different wound healing process is triggered, resulting in skin with hair follicles and oil-producing glands that is as strong and flexible as uninjured skin.[8] These insights into the processes of scar tissue formation may help improve wound treatment, and one day may enable clinicians to heal wounds without scarring.

Gene therapy for rare bone disease shows promise

NIDCR-funded scientists have shown in mice that a gene therapy to replace tissue-nonspecific alkaline phosphatase (TNAP), a key enzyme found in bone, may be a safe and effective single-dose treatment for hypophosphatasia (HPP). HPP is a rare, inherited bone disease that can cause limb and chest deformities, repeated fractures, and dental abnormalities that can lead to tooth loss. There is no cure for HPP, and current treatment options are expensive and burdensome. Researchers tested a one-time injection of *TNAP* DNA in a mouse model of HPP. The lifespans of treated mice increased from 10-12 days to more than 70 days (the end of the study), with no side effects in other organs.[9] Treatment also improved skeletal and dental abnormalities, prevented the fracturing and bowing of long bones, and led to near-typical formation and mineralization of teeth. These findings suggest gene therapy may be a promising method of treating HPP.

Budget Policy: The FY 2023 President's Budget estimate for this program is $46.4 million, an increase of $2.9 million or 6.8 percent compared to the FY 2022 CR 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.

Immune status, not HIV alone, may be a risk factor for caries

People living with HIV/AIDS and children born to HIV-infected mothers are at a higher risk of opportunistic infections, including those affecting the oral cavity. This susceptibility is thought to be due to HIV's impairment of the immune system. Antiretroviral therapy has increased survival and reduced the prevalence of oral diseases like oral candidiasis, but its effects on caries

[8] www.science.org/doi/10.1126/science.abi5770
[9] pubmed.ncbi.nlm.nih.gov/34076297/

LASKER SCHOLARS ADVANCE TREATMENTS FOR ORAL AND CRANIOFACIAL DISORDERS

The Lasker Clinical Research Scholars Program is a prestigious NIH award that supports a small number of exceptional, early-career clinical researchers to promote their development into fully independent investigators.

The NIDCR intramural program is currently home to two Lasker scholars. One, a pediatric endocrinologist, is studying fibrous dysplasia/McCune Albright syndrome (FD/MAS), a rare disease that affects the development of bones during childhood, making them break easily and grow irregularly. Many patients with FD/MAS have low blood levels of phosphate due to overexpression of a protein called FGF23. A monoclonal antibody that targets FGF23 overexpression, called burosumab, has been approved by the U.S. Food and Drug Administration to treat other conditions marked by high levels of phosphate, but it has not been studied in FD/MAS. The researchers treated a seven-year-old patient with severe FD/MAS with burosumab—the first reported use of the drug for FD/MAS. The treatment improved the patient's phosphate levels, decreased bone pain, and improved muscle strength and stamina. No fractures occurred in the 17 months following treatment. The investigators concluded that the patient's encouraging response warrants continued study of burosumab in the FD/MAS pediatric population.

The second Lasker scholar, the first dentist-scientist at NIH to earn tenure-track status as a Lasker scholar, is using their expertise in clinical dentistry and immunology to study the development of oral chronic graft-versus-host disease (GVHD). The condition, which causes severe oral lesions and reduced salivary gland function, can arise when new immune cells from bone marrow or blood stem cell transplants recognize the recipient's tissues as foreign and attack. While chronic GVHD can occur in multiple organs, the salivary glands and mucous lining of the mouth are affected in 40 percent to 80 percent of all people with the disease. One study identified a protein called ZG16B as a potential salivary biomarker of oral chronic GVHD, while another study is testing the immune-modulating drug pomalidomide in a Phase II clinical trial in patients with GVHD.

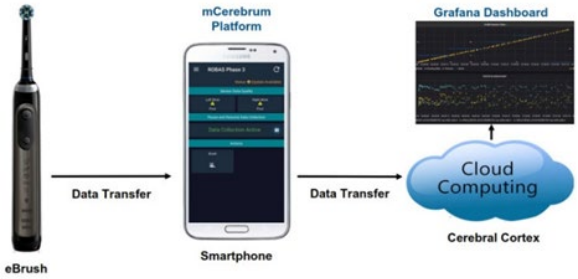
and periodontal disease have been unclear. NIDCR-supported scientists investigated the links among HIV infection, caries, and the oral microbiome (the community of microorganisms in the mouth) in children. The researchers studied three groups: children infected with HIV; children exposed to HIV but uninfected; and children who were unexposed and uninfected. Children who were uninfected but had weakened immune systems for other reasons were more likely to have caries than children with HIV and normal immunity. These results indicate that the risk of caries is related to the strength of the immune system, not the HIV infection itself.[10]

Preventative care may help reduce oral health disparities in children

In the United States, children from underserved and vulnerable populations often have more oral health problems and visit the dentist less frequently than other children. To address these oral health disparities, preventative oral health services (POHS) such as fluoride varnish application, dental screening, and oral health behavior education, are now being offered in primary care settings for children enrolled in Medicaid. However, there is some concern that POHS could be used to replace dental visits, rather than supplementing them. Pediatric dental visits are still essential for comprehensive examination and monitoring of oral health and the risk of caries. To answer this question, NIDCR-funded investigators analyzed claims data from 38 state Medicaid programs between 2006 and 2014. The researchers found no evidence that medical POHS replaced pediatric dental visits. Rather, their findings suggested that POHS may be associated with increased dental visits.[11] The results highlight the importance of Medicaid programs for POHS and their potential role in reducing oral health disparities.

[10] pubmed.ncbi.nlm.nih.gov/32616727/
[11] pubmed.ncbi.nlm.nih.gov/32325007/

Using electronic toothbrushes to improve oral health



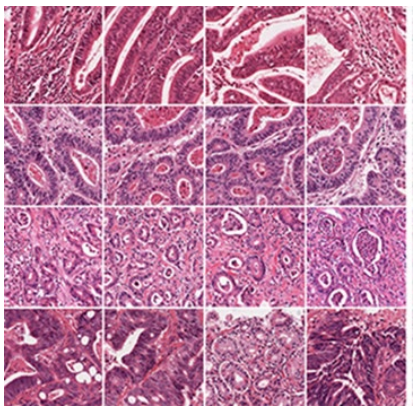
Dental diseases, including caries and periodontal disease, are very common despite evidence that brushing with fluoridated toothpaste twice a day helps remove plaque and reduces risk of these conditions. Digital health technologies have great potential for monitoring and improving brushing behaviors at home and promoting healthy behaviors. Taking advantage of the prevalence of electric toothbrushes and smartphones, NIDCR-supported investigators developed the Remote Oral Behaviors Assessment System (ROBAS), a low-cost platform that collects tooth-brushing data. A smartphone app collects information on the timing, duration, and frequency of brushing and transmits the data to a computing cloud for analysis and monitoring (*Figure, right*). The researchers showed that ROBAS accurately captured information about oral self-care in the home and was generally well accepted by users.[12] By providing automated coaching and reinforcing healthy oral behaviors at home, this electric toothbrush-based system could help improve oral self-care and health across large, diverse populations.

Budget Policy: The FY 2023 President's Budget estimate for this program is $135.0 million, an increase of $8.5 million or 6.8 percent compared to the FY 2022 CR level.

Preparing the next generation of oral health researchers

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

Using AI to diagnose cancer

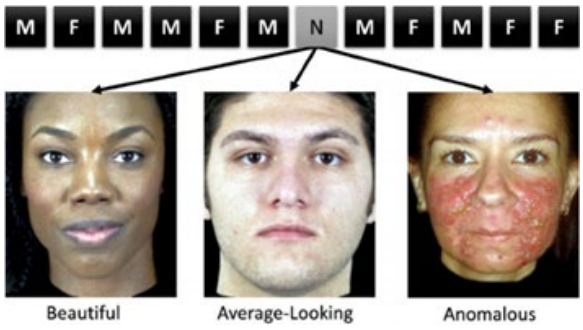


Recent advances in artificial intelligence (AI), deep learning (DL), natural language processing (NLP), and machine learning (ML) have opened the door for scientific and biomedical discoveries, including improvements in diagnosis and treatment of disease. Scientists, funded in part by an NIDCR Mentored Clinical Scientist Research Career Development award that seeks to bolster the research skills of clinicians, developed an AI method that could help improve cancer diagnosis. Clinicians have traditionally diagnosed cancer by examining biopsied tissue under a microscope or by

[12] pubmed.ncbi.nlm.nih.gov/32579118/

carrying out genetic testing. These methods can be expensive and may take several days or weeks to process. Using DL, the researchers developed a way to diagnose and categorize an individual's cancer based only on slide images of tumors (*Figure, previous page, bottom-right*). The DL algorithm consistently detected genetic and molecular changes from 14 different cancer types.[13] This method, which could be optimized for mobile devices, may allow for less expensive and more rapid cancer diagnoses, potentially enabling clinicians to develop earlier and more accessible personalized cancer treatment plans for patients.

Challenging the "scarred villain" stereotype



Movie villains often have scars or other atypical facial features. This trope is based on the "anomalous-is-bad" stereotype, which may lead to negative biases about people with atypical facial features. NIDCR-funded investigators used surveys and functional magnetic resonance imaging (fMRI) to determine how these biases affect behavior and brain function. Participants' responses to so-called "beautiful" (symmetrical), "average-looking", and "anomalous" (scarred, discolored) faces (*Figure, above*) suggested that people with anomalous faces experience more biases and receive less compassionate treatment by others. People with anomalous faces were also considered by participants to be less trustworthy, more anxious, and less content than those with traditionally "beautiful" faces. Viewing faces with irregular features led to responses in brain areas involved in experiencing emotion. This response was associated with participants' levels of empathic concern as well as stronger beliefs in the idea that "people get what they deserve."[14] A better understanding of the "anomalous-is-bad" stereotype may bring awareness to the social hardships and discrimination that people with facial differences may experience.

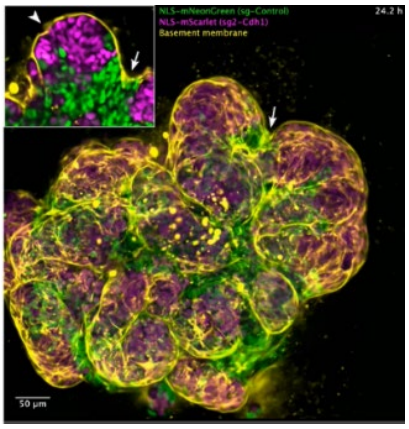
Budget Policy: The FY 2023 President's Budget estimate for this program is $26.5 million, an increase of $1.7 million or 6.8 percent compared to the FY 2022 CR level.

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

Scientists in NIDCR's Division of Intramural Research conduct cutting-edge basic, translational, and clinical research on dental, oral, and craniofacial health and disease. Taking advantage of the NIH Clinical Center and collaborations with extramural investigators, intramural researchers 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.

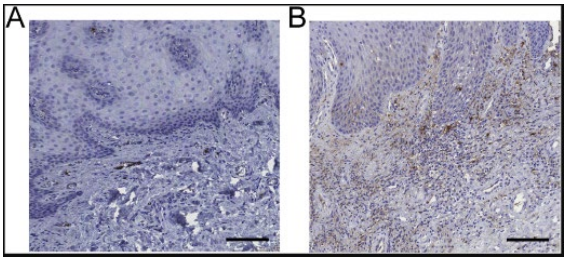
[13] pubmed.ncbi.nlm.nih.gov/33763651/
[14] pubmed.ncbi.nlm.nih.gov/33565114/

Scientists get one step closer to creating artificial salivary gland



Saliva is critical for the healthy function of our mouths. In diseases such as Sjögren's syndrome, salivary dysfunction can cause chronic dry mouth and lead to difficulty swallowing food, extensive tooth decay, tooth loss, and mouth sores. To help these individuals, NIDCR intramural researchers are exploring ways to restore salivary function. One project seeks to create artificial salivary glands to replace damaged ones. To that end, NIDCR scientists used an imaging method called two-photon microscopy to visualize mouse salivary gland development in real time. The researchers noticed that certain cells of the developing gland adhered to each other, while the less sticky cells moved freely to the gland's outer edges, resulting in the expansion of thousands of tiny protrusions, or buds, in a process called budding. The investigators used this knowledge to duplicate the budding process (*Figure, right*) in a laboratory dish.[15] These key initial steps may one day enable scientists to create a fully functioning artificial salivary gland.

Characterizing the cells in the mouth to better understand the oral immune barrier



The tissue lining the inside of the mouth, called the oral mucosa, acts as a physical and immune barrier, which makes it remarkably efficient at warding off pathogens and healing wounds. However, it is not well understood why the oral mucosa is so resilient, or what makes it vulnerable to inflammatory diseases like periodontitis (gum disease). To help answer these questions, NIDCR researchers collected oral mucosal cells from gum and inner cheek tissue of participants with and without severe periodontitis. The scientists studied the cells' gene expression patterns and categorized them by type and function.[16] The results indicated that one subset of cells called fibroblasts, which are known to produce connective tissue, were also playing a role in immunity by summoning immune cells called neutrophils to the oral cavity. (*Figure*, left, A). These fibroblasts appeared to become overactive in periodontitis (*Figure*, left, B), triggering an exaggerated immune response that could contribute to disease progression. The catalog of oral cells is publicly available for other investigators to use in future studies of periodontitis and other oral diseases.

Budget Policy: The FY 2023 President's Budget estimate for NIDCR intramural research is $76.1 million, an increase of $1.8 million or 2.4 percent compared to the FY 2022 CR level.

[15] pubmed.ncbi.nlm.nih.gov/34133940/
[16] pubmed.ncbi.nlm.nih.gov/34129837/

Research Management and Support (RMS)

NIDCR research management and support (RMS) personnel efficiently lead and direct the world's largest oral health research enterprise and 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 programs, analyze and advance science policy, coordinate program planning and evaluation, and lead stakeholder outreach and communications.

Budget Policy: The FY 2023 President's Budget estimate for RMS at NIDCR is $32.8 million, an increase of $1.0 million or 3.0 percent compared to the FY 2022 CR 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
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	$519,010,000	$515,720,000	$484,867,000
Rescission				$0
2023	$513,191,000			

[1] Budget Estimate to Congress includes mandatory financing.

Authorizing Legislation

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2022 Amount Authorized	FY 2022 CR	2023 Amount Authorized	FY 2023 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$484,867,000	Indefinite	$513,191,000
National Institute of Dental and Craniofacial Research	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$484,867,000		$513,191,000

NATIONAL INSTITUTES OF HEALTH

National Institute of Dental and Craniofacial Research

Amounts Available for Obligation [1]

(Dollars in Thousands)

Source of Funding	FY 2021 Final	FY 2022 CR	FY 2023 President's Budget
Appropriation	$484,867	$484,867	$513,191
Secretary's Transfer	-$1,456	$0	$0
OAR HIV/AIDS Transfers	-$24	$0	$0
Subtotal, adjusted budget authority	$483,387	$484,867	$513,191
Unobligated balance, start of year	$0	$0	$0
Unobligated balance, end of year (carryover)	$0	$0	$0
Subtotal, adjusted budget authority	**$483,387**	**$484,867**	**$513,191**
Unobligated balance lapsing	$0	$0	$0
Total obligations	$483,387	$484,867	$513,191

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2021 - $2,504 FY 2022 - $2,504 FY 2023 - $2,504

Budget Authority by Object Class

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Authority by Object Class[1]
(Dollars in Thousands)

		FY 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022
Total compensable workyears:				
	Full-time equivalent	252	252	0
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$203	$207	$4
	Average GM/GS grade	12.1	12.1	0.0
	Average GM/GS salary	$117	$120	$2
	Average salary, Commissioned Corps (42 U.S.C. 207)	$125	$128	$3
	Average salary of ungraded positions	$147	$150	$3
	OBJECT CLASSES	**FY 2022 CR**	**FY 2023 President's Budget**	**FY 2023 +/- FY 2022**
	Personnel Compensation			
11.1	Full-Time Permanent	$17,524	$18,180	$656
11.3	Other Than Full-Time Permanent	$12,376	$12,839	$463
11.5	Other Personnel Compensation	$1,006	$1,044	$38
11.7	Military Personnel	$125	$129	$5
11.8	Special Personnel Services Payments	$3,830	$3,973	$143
11.9	**Subtotal Personnel Compensation**	**$34,861**	**$36,166**	**$1,304**
12.1	Civilian Personnel Benefits	$11,674	$12,074	$400
12.2	Military Personnel Benefits	$71	$74	$3
13.0	Benefits to Former Personnel	$0	$0	$0
	Subtotal Pay Costs	**$46,607**	**$48,314**	**$1,707**
21.0	Travel & Transportation of Persons	$42	$43	$1
22.0	Transportation of Things	$170	$174	$4
23.1	Rental Payments to GSA	$0	$0	$0
23.2	Rental Payments to Others	$0	$0	$0
23.3	Communications, Utilities & Misc. Charges	$126	$129	$3
24.0	Printing & Reproduction	$25	$25	$1
25.1	Consulting Services	$17,457	$17,811	$354
25.2	Other Services	$8,704	$8,993	$289
25.3	Purchase of Goods and Services from Government Accounts	$41,726	$42,791	$1,065
25.4	Operation & Maintenance of Facilities	$108	$108	$0
25.5	R&D Contracts	$5,569	$5,681	$112
25.6	Medical Care	$347	$362	$14
25.7	Operation & Maintenance of Equipment	$1,001	$1,023	$22
25.8	Subsistence & Support of Persons	$0	$0	$0
25.0	**Subtotal Other Contractual Services**	**$74,913**	**$76,768**	**$1,855**
26.0	Supplies & Materials	$4,575	$4,675	$101
31.0	Equipment	$1,805	$1,844	$40
32.0	Land and Structures	$577	$589	$13
33.0	Investments & Loans	$0	$0	$0
41.0	Grants, Subsidies & Contributions	$356,029	$380,630	$24,601
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	**$438,260**	**$464,877**	**$26,617**
	Total Budget Authority by Object Class	**$484,867**	**$513,191**	**$28,324**

[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 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022
Personnel Compensation			
Full-Time Permanent (11.1)	$17,524	$18,180	$656
Other Than Full-Time Permanent (11.3)	$12,376	$12,839	$463
Other Personnel Compensation (11.5)	$1,006	$1,044	$38
Military Personnel (11.7)	$125	$129	$5
Special Personnel Services Payments (11.8)	$3,830	$3,973	$143
Subtotal, Personnel Compensation (11.9)	**$34,861**	**$36,166**	**$1,304**
Civilian Personnel Benefits (12.1)	$11,674	$12,074	$400
Military Personnel Benefits (12.2)	$71	$74	$3
Benefits to Former Personnel (13.0)	$0	$0	$0
Subtotal Pay Costs	**$46,607**	**$48,314**	**$1,707**
Travel & Transportation of Persons (21.0)	$42	$43	$1
Transportation of Things (22.0)	$170	$174	$4
Rental Payments to Others (23.2)	$0	$0	$0
Communications, Utilities & Misc. Charges (23.3)	$126	$129	$3
Printing & Reproduction (24.0)	$25	$25	$1
Other Contractual Services			
Consultant Services (25.1)	$17,457	$17,811	$354
Other Services (25.2)	$8,704	$8,993	$289
Purchase of Goods and Services from Government Accounts (25.3)	$29,544	$30,091	$547
Operation & Maintenance of Facilities (25.4)	$108	$108	$0
Operation & Maintenance of Equipment (25.7)	$1,001	$1,023	$22
Subsistence & Support of Persons (25.8)	$0	$0	$0
Subtotal Other Contractual Services	**$56,814**	**$58,026**	**$1,212**
Supplies & Materials (26.0)	$4,575	$4,675	$101
Subtotal Non-Pay Costs	**$61,751**	**$63,072**	**$1,321**
Total Administrative Costs	**$108,358**	**$111,385**	**$3,027**

Detail of Full-Time Equivalent Employment (FTE)

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Full-Time Equivalent Employment (FTE)

Office	FY 2021 Final			FY 2022 CR			FY 2023 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Extramural Activities									
Direct:	18	-	18	19	-	19	19	-	19
Reimbursable:	1	-	1	1	-	1	1	-	1
Total:	19	-	19	20	-	20	20	-	20
Division of Intramural Research									
Direct:	139	1	140	143	1	144	143	1	144
Reimbursable:	10	-	10	10	-	10	10	-	10
Total:	149	1	150	153	1	154	153	1	154
Office of the Director									
Direct:	6	-	6	6	1	7	6	1	7
Total:	6	-	6	6	1	7	6	1	7
Office of Administrative Management									
Direct:	15	-	15	16	-	16	16	-	16
Total:	15	-	15	16	-	16	16	-	16
Office of Information Technology									
Direct:	8	-	8	9	-	9	9	-	9
Total:	8	-	8	9	-	9	9	-	9
Office of Science Policy and Analysis									
Direct:	6	-	6	7	-	7	7	-	7
Total:	6	-	6	7	-	7	7	-	7
Office of Communication and Health Education									
Direct:	7	-	7	7	-	7	7	-	7
Total:	7	-	7	7	-	7	7	-	7
Office of Clinical Trial Operations and Management									
Direct:	3	-	3	3	-	3	3	-	3
Total:	3	-	3	3	-	3	3	-	3
Division of Extramural Research									
Direct:	27	-	27	29	-	29	29	-	29
Total:	27	-	27	29	-	29	29	-	29
Total	240	1	241	250	2	252	250	2	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
2019	11.9
2020	12.1
2021	12.1
2022	12.1
2023	12.1

Detail of Positions

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Positions[1]

GRADE	FY 2021 Final	FY 2022 CR	FY 2023 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	$199,300	$203,286	$207,352
General Schedule			
GM/GS-15	16	17	17
GM/GS-14	27	29	29
GM/GS-13	42	44	44
GS-12	36	37	37
GS-11	9	10	10
GS-10	0	0	0
GS-9	11	13	13
GS-8	6	7	7
GS-7	6	7	7
GS-6	1	1	1
GS-5	0	0	0
GS-4	1	1	1
GS-3	1	1	1
GS-2	0	0	0
GS-1	1	1	1
Subtotal	157	168	168
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	1	2	2
Senior Grade	0	0	0
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	1	2	2
Ungraded	91	92	92
Total permanent positions	152	160	160
Total positions, end of year	250	263	263
Total full-time equivalent (FTE) employment, end of year	241	252	252
Average ES salary	$199,300	$203,286	$207,352
Average GM/GS grade	12.1	12.1	12.1
Average GM/GS salary	$114,929	$117,228	$119,573

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