National Institute of Dental and Craniofacial Research

CONGRESSIONAL JUSTIFICATION
FY 2024

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 2024 Budget Table of Contents

General Notes

1. FY 2023 Enacted levels cited in this document include the effects of the FY 2023 HIV/AIDS transfer, as shown in the Amounts Available for Obligation table.
2. Detail in this document may not sum to the subtotals and totals due to rounding.

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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.

75 years of dental, oral, and craniofacial research discovery

Since its inception in June 1948, the Institute has catalyzed discoveries about the basic biological mechanisms of diseases and the application of such knowledge to oral health care. NIDCR continues to prioritize science that puts patients and people first, alleviates pain and discomfort, and emphasizes preventive measures to reduce public health burdens and improve the quality of life for all Americans. This overarching vision is articulated in NIDCR's Strategic Plan: 2021-2026 which identifies the value-driven resources and investments designed to yield the greatest impact for those who endure the burdens of dental and oral diseases.

In 2023, we will mark our 75th anniversary. With a slate of events scheduled throughout the year, we will recognize key discoveries and achievements, current research from NIDCR-funded trainees, new collaborations and partnerships, and emerging efforts that are propelling dental, oral, and craniofacial sciences into the future.

NIDCR led a federal, multi-agency effort to examine the nation's oral health over the 20 years since the publication of the first U.S. Surgeon General's Report on oral health, published in 2000.[1] This new report, *Oral Health in America: Advances and Challenges*,[2] was released in December 2021. It drew on expertise from a broad group of hundreds of stakeholders to paint a comprehensive portrait of oral health in the United States. As the title suggests, there has been dramatic progress in some areas and less in others. The report has been widely disseminated and serves as a call to action for coordinated efforts among engaged communities including clinicians, scientists, professional and patient organizations, and local, state, and federal government agencies.

One of the key findings of the new report is that profound disparities continue to exist in oral health and healthcare access. NIDCR is committed to tackling these disparities and inequities, which result from a complex interplay among social, economic, and medical factors at individual and community levels.

[1] www.nidcr.nih.gov/research/data-statistics/surgeon-general
[2] www.nidcr.nih.gov/research/oralhealthinamerica

In a related effort, NIDCR fully supports the NIH UNITE[3] initiative, an agency-wide effort to address structural racism and help improve equity, inclusion, and excellence at NIH. Toward building unity and aligned with UNITE, we developed the *NIDCR Building Belonging* plan to advance diversity, equity, inclusion, and support for all members of the NIDCR workforce.

Expanding collaborations and partnerships to accelerate new discoveries

NIDCR has expanded collaborations across NIH in recent years. For example, the new Restoring Joint Health and Function to Reduce Pain (RE-JOIN) Consortium is part of the Helping to End Addiction Long-term®, or NIH HEAL Initiative®. RE-JOIN supports interdisciplinary research to identify and trace nerves in the jaw and temporomandibular joint, the hinge connecting the lower jaw to the skull. Improving our understanding of how these nerves change with age and disease might lead to new ways to alleviate temporomandibular disorders (TMDs). TMDs are a group of more than 30 different and poorly understood conditions that affect between 5 and 12 percent of the U.S. population,[4] primarily women, causing pain and dysfunction in the jaw joint and supporting muscles.

NIDCR is also partnering with the Accelerating Medicines Partnership® Autoimmune and Immune Mediated Diseases (AMP® AIM) program, which is a component of AMP®, a collaboration between NIH, the U.S. Food and Drug Administration (FDA), pharmaceutical companies, and nonprofit organizations that is managed by the Foundation for the NIH. AMP® AIM researchers study the cellular and molecular basis of Sjögren's disease[5] and advance new treatments. In Sjögren's disease, which affects up to four million people in the United States and more women than men, immune cells mistakenly destroy healthy cells in the glands that produce tears and saliva, causing painful dry eyes and mouth. The disease can also damage internal organs (liver, kidney, lungs), skin, nerves, and joints. Importantly, these complications can also occur in the context of other autoimmune illnesses.

Advancing translational research initiatives

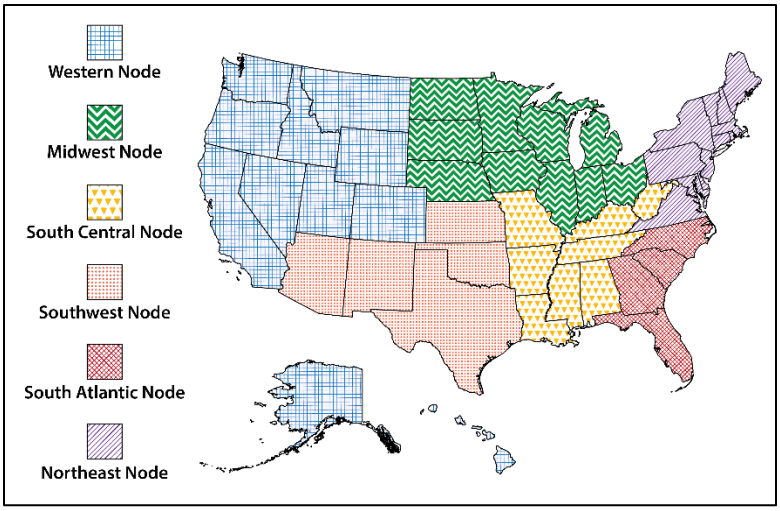
NIDCR supports several initiatives to translate basic science into clinical practice. One example is the FaceBase Consortium, which focuses on craniofacial development. About half of all birth defects involve the face and skull, but scientists don't fully understand the cause of these malformations. FaceBase is a comprehensive knowledge base used by the scientific community to understand healthy and abnormal facial structure development, to uncover the root of malformations such as cleft lip and palate, and identify ways to mitigate them.

Another NIDCR-led initiative leverages advances in tissue engineering and regenerative medicine. This effort, the multi-disciplinary Dental, Oral and Craniofacial Tissue Regeneration Consortium (DOCTRC), is designed to remove roadblocks and speed development of novel FDA-approved therapies for regenerating dental, oral, and craniofacial tissues lost to disease or trauma. This effort supports translational projects that take basic discoveries and move them along the translational pipeline, resulting in interactions with FDA (65 percent of projects) and issued or pending patent applications (95 percent of projects). Thus far, 41 translational projects have been awarded and rigorously assessed, ensuring only those projects that successfully meet

[3] www.nih.gov/ending-structural-racism/unite
[4] www.nidcr.nih.gov/research/data-statistics/facial-pain/prevalence
[5] www.nidcr.nih.gov/health-info/sjogrens-syndrome

key milestones will continue to move toward clinical trials and eventual adoption into clinical practice.

For more than 17 years, NIDCR has supported research at dental facilities across the United States through the National Dental Practice-Based Research Network. The program has enrolled over 62,000 patients and aims to translate research findings from national oral health studies into real-world improvements in patient care.



National Dental Practice-Based Research Network spans six regions of the United States and includes Western, Midwest, South Central, Southwest, South Atlantic, and Northeast nodes.

Training the next generation of oral health researchers

NIDCR takes a systems approach to research training aimed at building a vibrant and inclusive community of researchers who will advance science at all scales, from the molecular level to the community level. Some of our efforts focus on teaching dental professionals to conduct research. Other programs aim to increase the demographic diversity of the workforce.

One program designed to train researchers from underrepresented populations is the *Mentored Career Development Award to Promote Diversity in the Dental, Oral and Craniofacial Research Workforce*, which aims to facilitate the transition of early-career researchers to research independence. A related effort, the *Mentoring an Inclusive Network for a Diverse Workforce of the Future* (MIND the Future) initiative, teaches valuable grant writing skills to postdoctoral and junior faculty.

For dental professionals interested in conducting population-level oral health research, NIDCR hosts the *Dental Public Health and Research Fellowship*, the only three-year, full-time, combined dental public health and research fellowship program in the nation. For dentists interested in academic research careers, NIDCR offers the *Dental Clinical Research Fellowship.* This multi-year program includes hands-on research experiences in intramural laboratories and in the state-of-the-art NIH Clinical Center Dental Clinic that serves the unique patient population at NIH.

NIDCR intramural researchers in the NIH Clinical Center Dental Clinic

Emerging efforts in oral health science

NIDCR and several other NIH components are developing a new initiative to establish a national, interdisciplinary, patient-centered research consortium called the *TMD Collaborative for Improving Patient-Centered Translational Research* (TMD IMPACT). The effort will advance research, improve clinical care, and help train the next generation of TMD researchers. It grew out of a 2020 report[6] from the National Academies of Sciences, Engineering, and Medicine, sponsored by NIDCR and the NIH Office of the Director, and a subsequent Multi-Council Working Group comprised of advisory council members from eight NIH components.

NIDCR also seeks to expand research training into dental school clinics to equip future oral health leaders to carry out research. The new initiative, *Practice-based Research Integrating Multidisciplinary Experiences in Dental Schools* (PRIMED), will foster a culture of scientific inquiry and provide research opportunities and mentoring in care delivery sites that provide health care services to uninsured, Medicaid, and other special or vulnerable populations.

Another emerging effort focuses on improving prevention and outcomes in patients with head and neck cancers (HNCs). HNCs are the sixth most common cancer worldwide, and include a diverse range of malignancies, including oral, nasal, and salivary gland cancers. A new NIDCR initiative called AHEAD (*Advancement of Head and Neck Cancer Early Detection Research*) is designed to predict cancer risk and prognosis through identifying biomarkers and novel technologies that detect malignant cells early and quickly. As part of AHEAD, the National Cancer Institute (NCI) is providing researchers access to its Early Detection Research Network resources for discovering, developing, and validating cancer biomarkers.

Although the nation's oral health has greatly improved over the last 75 years, some racial, ethnic, and socioeconomic groups continue to experience oral health disparities. NIDCR supports research to help reduce these disparities by identifying structural barriers such as difficulties in access to care, high costs of treatment, and the influence of upstream commercial and socioeconomic determinants that most affect underserved populations. One area of focus is dental caries (tooth decay), a disease that impacts the population across the lifespan. NIDCR is engaging leaders and experts across the nation to create a systems approach for reducing caries-related disparities and increasing prevention efforts for vulnerable populations.

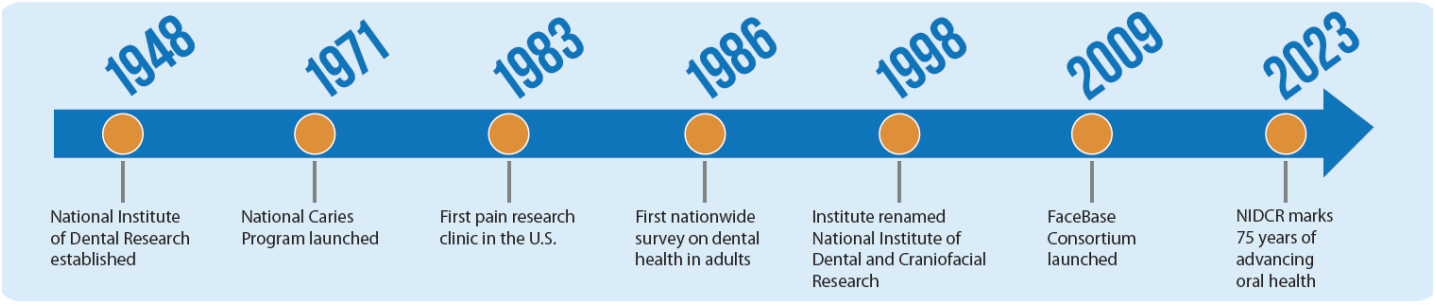
[6] nap.nationalacademies.org/catalog/25652/temporomandibular-disorders-priorities-for-research-and-care

Mission and History

- The National Institute of Dental and Craniofacial Research (NIDCR) aims to improve dental, oral, and craniofacial health. It also addresses public health challenges such as COVID-19, opioid use and pain management, temporomandibular disorders, oral cancers, and health disparities within its mission areas.
- The Institute was established on June 24, 1948 to address a troubling issue that prevailed during World War II—oral health in America was so poor that nearly 20 percent of military recruits were rejected because they failed to meet the minimum dental requirements.
- In 2023, NIDCR celebrates 75 years of advancements that have dramatically improved the nation's oral and overall health.

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

Timeline



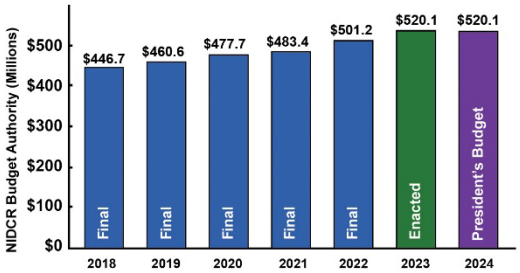
Research Highlights

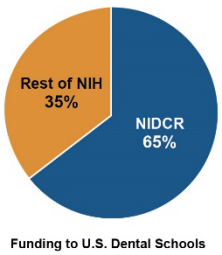
- Developed a hand-held device and a color-changing "smart mask" for quick, easy, and affordable COVID-19 detection in a variety of settings.
- Discovered cellular reasons that may help explain why the alpha and delta variants of SARS-CoV-2 are so infectious.
- Discovered that certain bacteria in the gut can cause bone loss in the mouth, suggesting that adjusting the composition of gut bacteria might help prevent oral bone loss.
- Uncovered new insights into the molecular basis of pain that may lead to new, nonaddictive analgesics:
  - Low-intensity sound blunts pain in mice and might be useful as a non-opioid strategy for pain relief.
  - Real-time imaging and molecular studies in mice revealed a protein that intensifies orofacial pain and blocking the protein reduced pain.

Facts and Funding

- Largest funder of oral health research in the world.
- Funds research that informs the practices of **200,000** dental health care providers in the United States.
- Provides **65 percent** of NIH funding to U.S. dental schools.
- Trains dentist-scientists and supports **78 percent** of NIH awardees who have dental or oral health-related degrees.
- Awards about **44 percent** of its extramural budge to support research and research training at dental schools.

Funding History





National Institute of Dental and Craniofacial Research

Recent Accomplishments

- In October 2021, two NIDCR-supported researchers won the Nobel Prize in Physiology or Medicine for their discoveries of receptors for temperature and touch.
- On December 21, 2021, NIDCR released *Oral Health in America: Advances and Challenges*, which proposes strategies for addressing the nation's oral health challenges.
- On January 7, 2022, NIDCR released *Science: Advancing Oral Health for All*, a strategic plan covering the Institute's vision though 2026.

Current Activities

- To uncover the molecular pathways underlying Sjögren's disease, NIDCR is participating in the **Accelerating Medicines Partnership Autoimmune and Immune Mediated Diseases (AMP® AIM)** program.
- Through the **FaceBase consortium**, NIDCR supports scientific resources to study craniofacial development and to uncover the causes of and potential therapies for malformations.
- The **Dental, Oral and Craniofacial Tissue Regeneration Consortium** supports multi-disciplinary teams focused on developing therapies to regrow dental, oral, and craniofacial tissues lost to disease or trauma.
- The **National Dental Practice-Based Research Network** aims to bring research findings into clinical practice.
- Diverse early-stage scientists receive support toward independent research careers in dental, oral, and craniofacial sciences through **NIDCR's Mentoring Network Program**.

New and Future Initiatives

- Through the **RE-JOIN Consortium** within the **NIH HEAL Initiative®**, NIDCR will support interdisciplinary research to study nerves in the temporomandibular joint and discover new approaches to pain relief.
- To improve clinical care for temporomandibular disorders (TMD), NIDCR plans to launch a national, NIH-wide consortium called the **TMD Collaborative for Improving Patient-Centered Translational Research (TMD IMPACT)**.
- To improve early detection of head and neck cancers, NIDCR is developing **the Advancement of Head and Neck Cancer Early Detection Research (AHEAD)** initiative.
- An initiative called **Practice-based Research Integrating Multidisciplinary Experiences in Dental Schools (PRIMED)** will provide clinical research experiences, skills development, and mentoring at dental schools.
- Looking forward, NIDCR is working to create a systems approach to reduce dental caries and minimize health disparities, enhance a diverse workforce through private-public partnerships, and leverage data-driven research within its intramural and extramural communities.

Major Changes in the Budget Request

Major changes by budget mechanism and/or budget detail are briefly described below. The FY 2024 President's Budget for NIDCR is $520.1 million, equal to the FY 2023 Enacted level.

Research Project Grants (-$1.9 million; total $340.4 million):
NIDCR will support a total of 689 Research Project Grant (RPG) awards in FY 2024. Noncompeting RPGs will increase by 41 awards and $11.1 million relative to the FY 2023 Enacted level with the implementation of a 2 percent reduction to noncompeting awards. Competing RPGs will decrease by 16.8 percent or 28 awards compared to the FY 2023 Enacted level of 173 awards, and the amount to support to competing awards will decrease by $13.0 million.

Research Training (+$0.3 million; total $13.8 million):
NIDCR will increase funding by 1.9 percent for Research Training relative to the FY 2023 Enacted level, maintaining 243 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 2022 Final		FY 2023 Enacted		FY 2024 President's Budget		FY 2024 +/- FY 2023	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Research Projects:								
Noncompeting	482	$228,604	478	$245,774	519	$256,894	41	$11,120
Administrative Supplements	*(45)*	$4,424	*(45)*	$4,424	*(45)*	$4,424	*(0)*	$0
Competing:								
Renewal	22	$11,023	21	$10,460	17	$8,706	-4	-$1,754
New	162	$70,449	152	$66,851	128	$55,640	-24	-$11,211
Supplements	0	$0	0	$0	0	$0	0	$0
Subtotal, Competing	**184**	**$81,472**	**173**	**$77,311**	**145**	**$64,346**	**-28**	**-$12,965**
Subtotal, RPGs	666	$314,499	651	$327,508	664	$325,664	13	-$1,845
SBIR/STTR	24	$14,092	25	$14,798	25	$14,707	0	-$91
Research Project Grants	690	$328,591	676	$342,306	689	$340,371	13	-$1,935
Research Centers								
Specialized/Comprehensive	1	$3,769	1	$4,184	1	$4,184	0	$0
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**	**$3,769**	**1**	**$4,184**	**1**	**$4,184**	**0**	**$0**
Other Research:								
Research Careers	73	$10,804	79	$11,020	79	$11,020	0	$0
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	$0	0	$109	0	$104	0	-$5
Other	24	$15,378	27	$17,061	27	$17,061	0	$0
Other Research	**97**	**$26,181**	**106**	**$28,189**	**106**	**$28,184**	**0**	**-$5**
Total Research Grants	788	$358,541	783	$374,679	796	$372,739	13	-$1,940
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	115	$5,653	117	$5,936	117	$6,049	0	$113
Institutional Awards	123	$7,246	126	$7,608	126	$7,753	0	$145
Total Research Training	**238**	**$12,899**	**243**	**$13,544**	**243**	**$13,802**	**0**	**$258**
Research & Develop. Contracts	25	$22,994	24	$24,071	24	$23,594	0	-$477
SBIR/STTR (non-add)	*(0)*	*($147)*	*(0)*	*($152)*	*(0)*	*($152)*	*(0)*	*($0)*
Intramural Research	147	$74,883	154	$75,632	154	$77,145	0	$1,513
Res. Management & Support	92	$31,890	98	$32,212	98	$32,859	0	$647
SBIR Admin. (non-add)		*($3)*		*($3)*		*($5)*		*($2)*
Construction		$0		$0		$0		$0
Buildings and Facilities		$0		$0		$0		$0
Total, NIDCR	**239**	**$501,207**	**252**	**$520,138**	**252**	**$520,138**	**0**	**$0**

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

NATIONAL INSTITUTES OF HEALTH

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, [$520,163,000]*$520,138,000.*

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

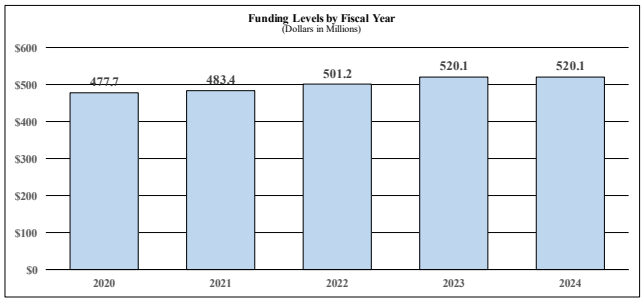
Summary of Changes
(Dollars in Thousands)

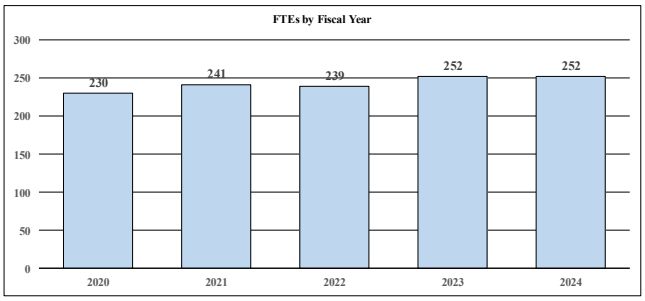
FY 2023 Enacted	$520,138
FY 2024 President's Budget	$520,138
Net change	$0

CHANGES	FY 2023 Enacted FTEs	FY 2023 Enacted Budget Authority	FY 2024 President's Budget FTEs	FY 2024 President's Budget Budget Authority	Built-In Change from FY 2023 Enacted FTEs	Built-In Change from FY 2023 Enacted Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of FY 2023 pay and benefits increase		$30,472		$32,100		$338
b. FY 2024 pay and benefits increase		$30,472		$32,100		$1,167
c. Paid days adjustment		$30,472		$32,100		$117
d. Differences attributable to change in FTE		$30,472		$32,100		$0
e. Payment for centrally furnished services		$12,525		$12,725		$200
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$32,635		$32,319		$785
Subtotal						$2,608
2. Research Management and Support:						
a. Annualization of FY 2023 pay and benefits increase		$17,900		$18,856		$198
b. FY 2024 pay and benefits increase		$17,900		$18,856		$685
c. Paid days adjustment		$17,900		$18,856		$69
d. Differences attributable to change in FTE		$17,900		$18,856		$0
e. Payment for centrally furnished services		$1,845		$1,875		$30
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$12,466		$12,128		$299
Subtotal						$1,281
Subtotal, Built-in						$3,889

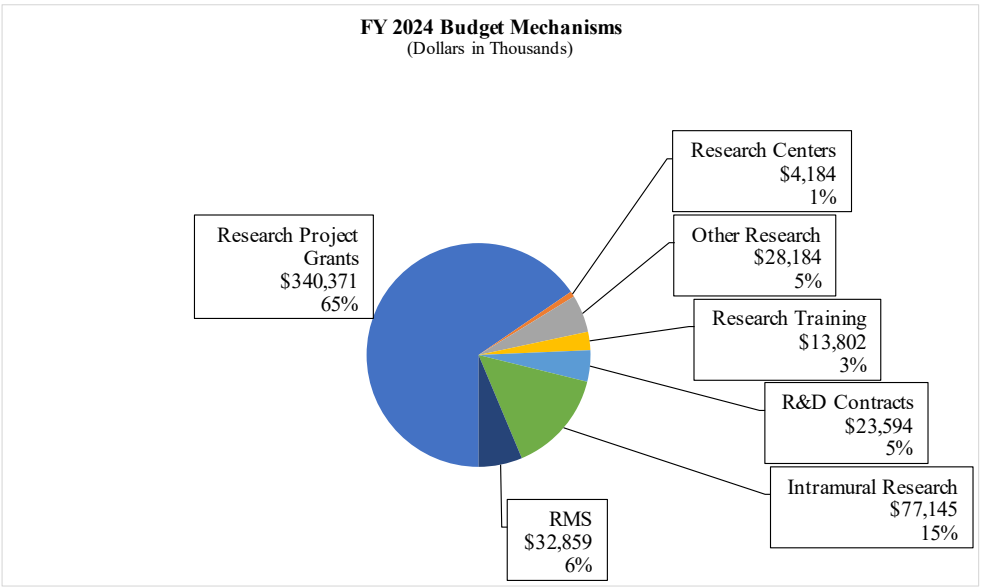
CHANGES	FY 2023 Enacted No.	FY 2023 Enacted Amount	FY 2024 President's Budget No.	FY 2024 President's Budget Amount	Program Change from FY 2023 Enacted No.	Program Change from FY 2023 Enacted Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	478	$250,198	519	$261,318	41	$11,120
b. Competing	173	$77,311	145	$64,346	-28	-$12,965
c. SBIR/STTR	25	$14,798	25	$14,707	0	-$91
Subtotal, RPGs	676	$342,306	689	$340,371	13	-$1,935
2. Research Centers	1	$4,184	1	$4,184	0	$0
3. Other Research	106	$28,189	106	$28,184	0	-$5
4. Research Training	243	$13,544	243	$13,802	0	$258
5. Research and development contracts	24	$24,071	24	$23,594	0	-$477
Subtotal, Extramural		$412,295		$410,135		-$2,160
6. Intramural Research	154	$75,632	154	$77,145	0	-$1,095
7. Research Management and Support	98	$32,212	98	$32,859	0	-$633
8. Construction		$0		$0		$0
9. Buildings and Facilities		$0		$0		$0
Subtotal, Program	252	$520,138	252	$520,138	0	-$3,889
Total built-in and program changes						$0

History of Budget Authority and FTEs:

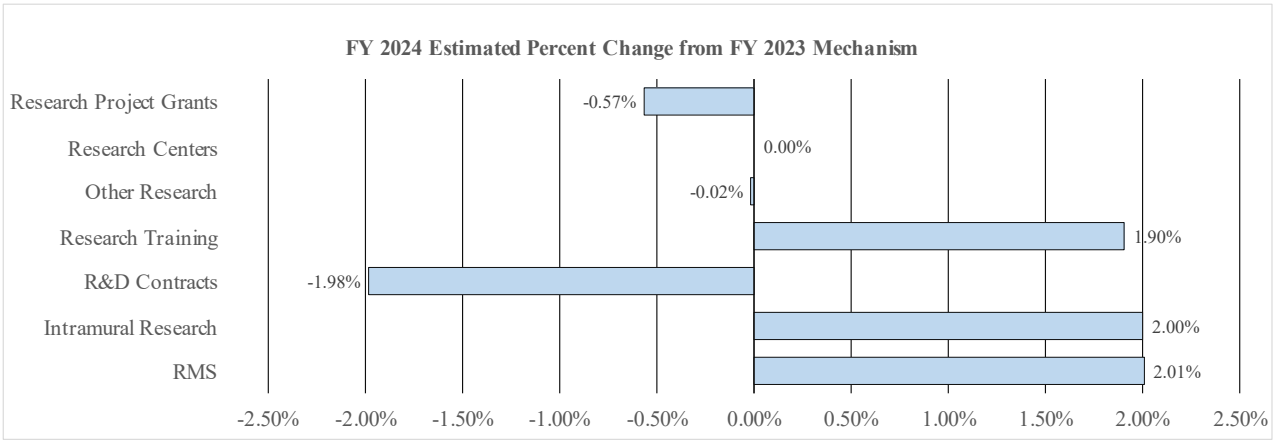




Distribution by Mechanism:



Change by Selected Mechanisms:



National Institute of Dental and Craniofacial Research
Office of the Director
Director, Dr. Rena N. D'Souza
Deputy Director, Dr. Jennifer Y. Webster-Cyriaque
Associate Director for Management, Ms. Kathleen G. Stephan
Office of Administrative Management
Associate Director for Management
Ms. Kathleen G. Stephan
Office of Information Technology
Chief Information Officer
Mr. John A. Prue
Office of Clinical Trials Operations and Management
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Division of Extramural Research
Director
Dr. Lillian R. Shum
Division of Extramural Activities
Director
Dr. Lynn M. King

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Budget Authority by Activity *
(Dollars in Thousands)

	FY 2022 Final		FY 2023 Enacted		FY 2024 President's Budget		FY 2024 +/- FY 2023 Enacted	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Building the foundation of knowledge for improving oral health		$182,022		$190,264		$189,267		-$997
Translating research discoveries into diagnostics, therapies, and cures		$45,980		$48,062		$47,810		-$252
Advancing clinical research to enhance health and reduce illness		$140,372		$146,728		$145,959		-$769
Preparing the next generation of oral health researchers		$26,061		$27,241		$27,098		-$143
Subtotal, Extramural		**$394,434**		**$412,295**		**$410,135**		**-$2,160**
Intramural Research	**147**	**$74,883**	**154**	**$75,632**	**154**	**$77,145**	**0**	**$1,513**
Research Management & Support	**92**	**$31,890**	**98**	**$32,212**	**98**	**$32,859**	**0**	**$647**
TOTAL	**239**	**$501,207**	**252**	**$520,138**	**252**	**$520,138**	**0**	**$0**

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

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 2022 Final	FY 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
BA	$501,207,000	$520,138,000	$520,138,000	$0
FTE	239	252	252	0

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

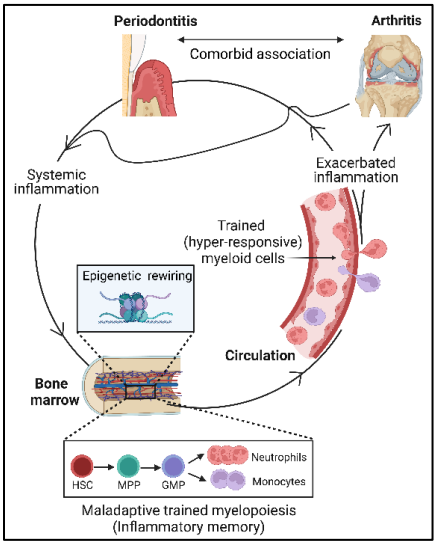
Overall Budget Policy: The FY 2024 President's Budget request for NIDCR is $520.1 million, the same as the FY 2023 Enacted level. NIDCR will maximize efforts to enhance the diversity of the dental, oral, and craniofacial (DOC) biomedical research workforce by identifying key barriers to success and fostering pathways to increase the participation of underrepresented groups in DOC research.

Program Descriptions and Accomplishments

NIDCR advances the prevention, detection, diagnosis, and treatment of oral conditions, diseases, and disorders through a comprehensive dental, oral, and craniofacial research and training portfolio. The narratives that follow highlight the impact of some of the Institute's work.

Building the foundation of knowledge for improving oral health

NIDCR supports basic research that fosters a better understanding of the genetics underlying dental, oral, and craniofacial diseases; yields insights into connections between oral health and overall health as well as associated disparities; advances the development of improved dental restorative materials and novel oral biodevices; and enables multidisciplinary investigations into the transition from acute to chronic orofacial pain and overlapping pain conditions.



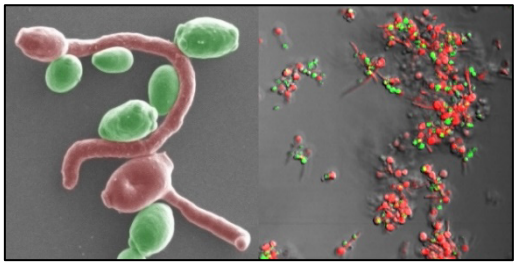
Overview of the connections between periodontitis, arthritis, and the immune system. Credit: George Hajishengallis, prepared using Biorender.com

Inflammation rooted in immune system stem cells

The body's innate immune system is poised to kick in within hours of an infection. Its protective abilities come from a type of stem cell found within bone marrow. These cells, called hematopoietic stem cells (HSCs), launch an inflammatory response by producing a variety of immune cells that circulate in the body and fight off infectious agents. Some inflammatory conditions, such as periodontitis (gum disease) and arthritis, often occur together in a "comorbid association" that can push the innate immune system into overdrive. In such cases, HSCs become permanently rewired into a constant state of high alert, contributing to chronic inflammation and the progressive erosion of teeth, bones, and joints. Eager to uncover whether HSCs link these inflammatory disorders, NIDCR-supported researchers extracted HSCs from mice with periodontitis and transplanted them into healthy mice. The animals became more susceptible to inflammatory arthritis, and this susceptibility was linked to a specific type of immune molecule called IL-1.[7] These findings suggest that blocking IL-1 might help alleviate inflammation in periodontitis and arthritis.

Sweet relief from fungal disease

The mouth is an important gatekeeper that protects against harmful fungi, viruses, and bacteria, and maintains a proper balance of helpful microbes (the oral microbiota). An inadequate or malfunctioning immune system can allow diseases such as fungal infections to take hold inside the mouth. Such infections can cause soreness, pain, numbness, loss of taste, and if they spread to the bloodstream, severe illness or death. To uncover how these types of fungal



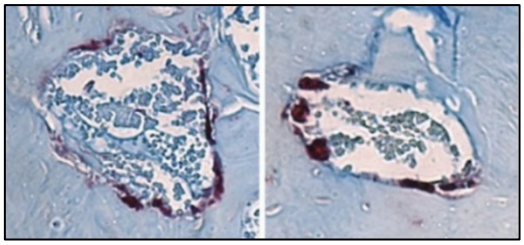
Two different oral fungal pathogens (red and green) captured by scanning electron microscopy. Credit: Edgerton Lab

[7] pubmed.ncbi.nlm.nih.gov/35483374/

infections are affected by changes in the oral environment, NIDCR-supported scientists used a combination of sugar and antibiotic treatment to alter the balance of helpful and harmful oral bacteria in immunocompromised mice, and then assessed the effects on fungal disease.[8] They found that increasing the prevalence of a specific type of bacteria called *Lactobacillus*, a common probiotic used in dietary supplements and foods like yogurt, could inhibit the growth of harmful fungi and prevent disease. This finding suggests that increasing *Lactobacillus* levels within the oral microbiota may be a useful approach to combatting oral fungal disease in immunocompromised individuals.

The gut's role in oral bone health

Disruption in the balance of oral microbes may also lead to periodontal disease, which can cause loss of the alveolar bone that supports and anchors the teeth. But the microbes in the gut (digestive tract) may also play a role in maintaining alveolar bone. NIDCR-supported researchers have found that certain gut bacteria can stimulate immune cells, which in turn release a series of molecules that prompt alveolar bone loss.[9] The study challenges previous notions that bone loss in the mouth is regulated solely by oral microbes. It also opens the possibility that noninvasive interventions to modulate gut bacteria, such as changing one's diet or taking probiotics, could support oral health.



Healthy alveolar bone (left) compared to alveolar bone in mice with a specific gut microbe associated with bone loss (right). Credit: Novince Lab

Budget Policy: The FY 2024 President's Budget estimate for this program is $189.3 million, a decrease of $1.0 million or 0.5 percent compared to the FY 2023 Enacted level.

[8] pubmed.ncbi.nlm.nih.gov/34399623/
[9] pubmed.ncbi.nlm.nih.gov/34934182/

Craniosynostosis at the crossroads of developmental biology, genomics, bioengineering, and data science

Babies have gaps between their skull bones that allow for expansion around a growing brain. Flexible tissues called sutures bridge these gaps. For 1 in every 2,500 infants in the United States, one or more of these sutures closes before the brain is fully formed. This condition, called craniosynostosis, limits brain growth, leading to developmental delays and intellectual disabilities.

NIDCR-supported researchers seek to understand suture development and to identify treatments for craniosynostosis through multifaceted, interdisciplinary studies, including those featured below.

A team of scientists performed a cell-by-cell analysis of gene activity in healthy sutures of mouse embryos. The study suggests that a gene called *Hhip* is required for normal suture development. When this gene was inactivated, mouse embryos lost suture tissue too soon and developed misshapen skull bones.

As an initial step toward regenerating sutures in children with craniosynostosis, one research group used tissue engineering scaffolds—supportive structures that mimic the physical and chemical environment of growing cells—to cultivate stem cells that develop suture and bone tissues.

Integrating human genomic and clinical data has provided insights into craniosynostosis and less invasive diagnostics. By analyzing DNA from children with a common form of craniosynostosis—and from their parents—researchers discovered gene variants associated with craniosynostosis. Another team of researchers used computerized tomography (CT) scans of 278 healthy infant skulls to create a statistical model that accurately predicted normal skull bone growth in infants. This data-driven model can help researchers and clinicians identify abnormal growth patterns in craniosynostosis and related conditions. Another group developed a skull-imaging technique to enable rapid and radiation-free diagnosis and surgical planning. These discoveries can help improve detection and treatment options for children with craniosynostosis.

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.

Developing a smart mask to surveil coronavirus

The virus that causes COVID-19, known as SARS-CoV-2, has a vexing trait that helps it spread—it can be contagious without causing symptoms. Infected people constantly exhale tiny, virus-laden droplets—largely invisible to the naked eye—and produce aerosols that linger in the air, putting others at risk for infection. How can we know if we're infected or infectious when we feel fine? To help answer this question, NIDCR-supported researchers are working to create a "smart" mask that detects SARS-CoV-2 infection using a sticker-like test strip affixed to the mask's inner layer.[10] The strip would change color when exposed to virus expelled in the wearer's saliva or breath. If successful, this approach would provide a rapid, simple, affordable, and reliable viral detection tool that could be useful for catching outbreaks earlier and faster.

New approach to relieving symptoms of Sjögren's disease

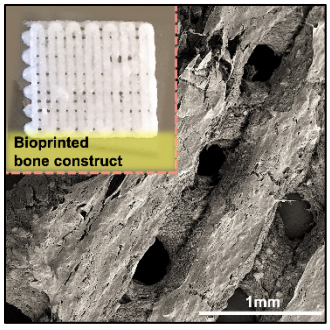
Autoimmune diseases develop when the body's natural defense system can no longer tell the difference between self and foreign cells. Depending on where this immune system breakdown happens in the body, it can affect a wide range of organs and systems. In the autoimmune disorder Sjögren's disease, the immune system attacks and destroys healthy cells in the glands that produce tears and saliva, causing painful dry eyes and mouth. The disease can also damage internal organs, skin, nerves, and joints. NIDCR-supported researchers are testing new holistic, patient-centered approaches to help alleviate the symptoms of Sjögren's disease. Gamma-aminobutyric acid (GABA) is a neurotransmitter, or chemical messenger, that is marketed as a dietary supplement to help relieve anxiety. GABA has been shown to have anti-

[10] pubmed.ncbi.nlm.nih.gov/34309356/

inflammatory effects and has been successfully used in mouse models to treat type 1 diabetes, multiple sclerosis, and rheumatoid arthritis Using two different mouse models of Sjögren's disease, researchers discovered that treatment with GABA was able to improve saliva and tear production when administered either before or after the onset of clinical symptoms.[11] Further research is needed to understand how GABA functions, but this treatment approach is a promising avenue for alleviating the symptoms of Sjögren's disease.

Bioprinting holds promise for repairing craniofacial bone

Bioprinting, a type of 3D printing using bio-compatible "bioink," has great potential for reconstructing damaged or missing structures in the body. Craniofacial defects, such as cleft lip and cleft palate, are some of the most common birth defects. One challenge for repairing craniofacial defects is the complexity of both form and function needed to successfully replace living tissues like bone, muscle, and skin. NIDCR-supported scientists have developed a process for overcoming these challenges by bioprinting directly onto damaged craniofacial bones in mice.[12] The technique they developed uses an enriched bioink pre-loaded with both quick-release molecules that recruit healthy cells to the damaged site and slow-release molecules that instruct those cells to turn into functional bone. Using this strategy, the scientists were able to significantly improve bone regeneration. Their approach could help promote quick treatment and accelerated bone repair and has great potential for translating bioprinting technologies from bench to bed side.



3D bioprinted bone (photo inset) and high-powered image from a scanning electron microscope. Credit: Ozbolat Lab

Budget Policy: The FY 2024 President's Budget estimate for this program is $47.8 million, a decrease of $0.3 million or 0.5 percent compared to the FY 2023 Enacted level.

<u>Advancing clinical research to enhance health and reduce illness</u>

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

Insights into opioid prescribing for dental pain

Prescription opioid misuse remains a significant public health crisis in America. When taken as prescribed for short periods under a doctor or dentist's care, opioids can be an effective pain management tool. However, prescription opioids also carry the risk of misuse and addiction. To identify the factors associated with opioid prescribing by dentists, NIDCR-supported researchers examined electronic health record data from over 90,000 patients in a large dental practice embedded within a health care system.[13] They discovered that although opioids were infrequently prescribed overall, opioid prescribing rates varied considerably depending on the procedure type, with tooth extractions (26 percent) and oral surgery (25 percent) being the most common procedures for which an opioid was prescribed. In addition, among all encounters, young adults (aged 18–25), a group at high risk for opioid misuse, were most frequently given an

[11] pubmed.ncbi.nlm.nih.gov/35052808/
[12] pubmed.ncbi.nlm.nih.gov/34995904/
[13] pubmed.ncbi.nlm.nih.gov/34707399/

Accelerating progress toward immunotherapies for head and neck cancers

Head and neck cancers (HNCs) are the sixth most common cancer in the world. In the United States, more than 65,000 people are diagnosed each year. Only 40–50 percent survive five years after diagnosis. Immunotherapies, which boost immune defenses against cancer, have benefited only a small percentage of patients. NIDCR-supported researchers, such as those whose work is described below, hope to increase that percentage.

One case in which immunotherapy can fail is when tumors lack the right balance of immune cells. Researchers designed a cyclic dinucleotide-manganese nanoparticle (CMP), that rebalances immune cells in tumors. CMP shrank and eliminated tumors and prolonged survival in mice with immunotherapy-resistant HNC. If it works in people, CMP might improve therapies against these and other difficult-to-treat cancers.

Other scientists found a cost-effective way to predict whether cancer patients are likely to respond well to immunotherapy. They identified a new biomarker by calculating the relative levels of two types of immune cells, neutrophils and lymphocytes, in blood prior to treatment. This assay alone, or when combined with measurements of another biomarker, increased the accuracy of predicting patient responses to therapy. Another team analyzed immune cells called natural killer (NK) cells from HNC patients. They found that NK cells that migrate to tumors can develop into either of two subtypes: one that slows tumor growth and another that does not. The team identified the regulatory molecules that steer NK cells to become the first subtype. This approach might inform the design of novel therapies to fight cancer.

Scientists suppressed the growth of lung, pancreatic, and HNC tumors in mice by disabling a protein called MLCK210 in immune cells called myeloid cells, which seem to fuel tumor growth. MLCK210 functions by promoting myeloid cell adhesion, migration, and production of inflammatory signals. Targeting MLCK210 offers an immunotherapy approach for a variety of cancers.

opioid prescription as compared to younger and older age groups. In a separate, smaller NIDCR-funded study, researchers interviewed 15 pairs of parents or guardians and their adolescent children (aged 15–17) after the child had their wisdom tooth extracted.[14] All participants reported that the adolescents received an opioid prescription for pain management after tooth extraction. However, the researchers found that most adolescents undergoing tooth extractions reported little to no use of the opioids prescribed to them but did not receive provider guidance on how to safely dispose of unused opioids. This highlights the importance of involving adolescents in the pain management decision-making process and suggests an opportunity for providers to reduce the number of opioids prescribed following tooth extractions and educate patients and their parents about safe disposal of opioids to reduce the risk for their misuse.

Equalizing access to dental care

Regular visits to the dentist can keep our mouths healthy and keep tooth decay and other problems at bay. But studies show that most American adults do not see the dentist regularly. This is especially true for those with limited incomes, a group disproportionately represented by Hispanic and non-Hispanic Black adults. These Americans have significantly higher rates of untreated tooth decay compared to non-Hispanic White adults. These oral health disparities have stubbornly persisted over the last 20 years,[15] but a new analysis offers some hope. An NIDCR-supported study examined if expanded eligibility for Medicaid, a public health insurance program that assists Americans with limited income, reduced disparities in dental care.[16] The researchers analyzed responses from a nationally representative survey that asks U.S. adults about their health care, including their use of dental services. Based on survey responses from about 5,700 adults in states that expanded Medicaid eligibility and offered extensive dental benefits (coverage of at least 100

[14] pubmed.ncbi.nlm.nih.gov/35392856/
[15] www.nidcr.nih.gov/research/oralhealthinamerica
[16] pubmed.ncbi.nlm.nih.gov/34982622/

dental procedures), rates of dental visits by Hispanic and non-Hispanic Black adults increased from 14 to 21 percent and from 20 to 26 percent, respectively, while rates among non-Hispanic White adults remained unchanged at about 30 percent. The researchers found a similar narrowing in disparities in these states for use of preventive services like oral exams and teeth cleaning, and for dental treatments like fillings and root canals. However, survey responses from a separate group of about 3,500 adults indicated that disparities did not diminish in states that expanded Medicaid coverage yet offered more limited dental benefits. These findings demonstrate that expanding eligibility for public coverage of dental care can help reduce racial and ethnic oral health disparities.

Racial and ethnic disparities in use of dental services were lessened after public dental insurance eligibility was expanded. Credit: Adobe Stock

Understanding headache attributed to TMD

Most of us know the aching, pounding misery of headaches. For people with temporomandibular disorders (TMD), headache can be just one of many painful conditions experienced. Moreover, TMD and primary headaches, such as migraine or tension-type headaches, often occur together. In an NIDCR-supported study among adults with both TMD and primary headaches, researchers attempted to tease out the characteristics associated with headache attributed to TMD.[17] They found that a large proportion (61.6 percent) of participants had headache attributed to TMD and that this condition was more likely among participants who had migraine versus participants who had tension-type headaches. The researchers also found that among people with headache attributed to TMD, headaches were very common, occurred with high frequency, and were often first seen as migraines. Surprisingly, other characteristics, such as facial pain, general health, or psychological distress, were not associated with headache attributed to TMD. Further research is needed to fully understand headache attributed to TMD and to develop targeted treatment strategies needed to bring relief to patients.

Budget Policy: The FY 2024 President's Budget estimate for this program is $146.0 million, a decrease of $0.8 million or 0.5 percent compared to the FY 2023 Enacted level.

Preparing the next generation of oral health researchers

NIDCR is dedicated to building a highly skilled and diverse scientific workforce equipped to meet the challenges of the future. The Institute supports individual and institutional research training and career development programs that target a wide range of scientific fields and career stages; incorporate interdisciplinary training and promotion of dentist-scientist career paths; and support training within the NIDCR intramural program.

Pathway to independence brings new insight to inflammatory diseases

Through the *NIDCR Dual Degree Dentist Scientist Pathway to Independence Award*, NIDCR is supporting the research careers of promising dentist scientists working on immune system biology, head and neck cancer, and a variety of other critical research problems. One awardee is

[17] pubmed.ncbi.nlm.nih.gov/34022805/

part of a team that is working to uncover the relationship between the physical structure of bone marrow and immune cell function.[18] At the center of most bones lies the bone marrow, a source of stem cells that give rise to cartilage, fat, bone, and blood cells, including the immune cells that help fight infection and diseases. In a rare type of blood cancer called myelofibrosis, the bone marrow physically changes, becoming more rigid (or fibrotic), and the number of immune cells in the blood stream increases, resulting in a constant state of inflammation. Using a programmable hydrogel capable of mimicking either the healthy or fibrotic bone marrow environment, the team found that a fibrotic environment changed the fate of immune cells, driving them toward inflammation. By inhibiting a particular molecular switch, called PI3K-γ, they could reduce the number of immune cells and markers of inflammation. When the researchers examined a mouse model of myelofibrosis and blood samples from people with myelofibrosis—or several other inflammatory diseases, including fibrosis of the lung (pulmonary fibrosis) and liver (cirrhosis)—they recognized the same signature molecules they saw in the hydrogel model of fibrotic bone marrow. Altogether, these findings suggest that increasing the rigidity of bone marrow changes the fate of immune cells, resulting in inflammation and disease progression. The work could help improve treatments for cancers and inflammatory diseases.

Mentored career development – Medicaid expansion is associated with decreased suicide rates
The *NIDCR Mentored Career Development Award to Promote Diversity in the Dental, Oral, and Craniofacial Research Workforce* trains early-career investigators from underrepresented backgrounds. One awardee is part of a research team studying how to help reduce suicide risk. Suicide is a leading cause of death in the United States, with about 1 death every 11 minutes.[19] The research team analyzed suicide rates among nonelderly adults across all 50 U.S. states and Washington, D.C. to determine if expanded access to mental health care was associated with any changes in the suicide rate.[20] They found that in states with increased access to mental health care through Medicaid expansion under the Patient Protection and Affordable Care Act, there was a significant reduction in the relative number of suicide deaths compared to other states. The suicide mortality rate for people with head and neck cancer (HNC) is four times greater than that of the general U.S. population. Through a mentored career development award, this awardee is receiving the additional training needed to pursue an independent career in implementing evidence-based interventions to detect and mitigate suicide risks among HNC patients.

Budget Policy: The FY 2024 President's Budget estimate for this program is $27.1 million, a decrease of $0.1 million or 0.5 percent compared to the FY 2023 Enacted 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 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.

[18] pubmed.ncbi.nlm.nih.gov/35817965/
[19] www.cdc.gov/suicide/facts/index.html
[20] pubmed.ncbi.nlm.nih.gov/35704315/

Disarming a blood-clotting protein prevents gum disease in mice

Periodontal disease affects nearly half of Americans over age 30, and 70 percent of those aged 65 and older. It is a bacterial infection of the tissues supporting the teeth. In its early stages, periodontal disease causes redness and swelling (inflammation) of the gums. At an advanced stage, called periodontitis, the underlying bone becomes damaged, leading to tooth loss. It is known that periodontitis is driven in part by an exaggerated immune cell response, but it is unclear what triggers the response, and how it causes tissue and bone damage. NIDCR intramural researchers discovered that buildup of a blood-clotting protein called fibrin activates an overactive immune response that damages the gums and underlying bone. Suppressing fibrin activity prevented bone loss from periodontal disease in mice.[21] Clinical research will test whether a similar strategy could be used to prevent or treat human disorders marked by fibrin buildup, including periodontal disease, arthritis, and multiple sclerosis (MS).

Orofacial pain comes to light

From a throbbing tooth or aching jaw to a pounding migraine, pain in the mouth and face—known as orofacial pain—affects 5 to 12 percent of the population. Such pain can hinder daily activities like eating, tooth-brushing, and mask-wearing. Understanding how facial nerves process pain signals could help scientists find effective interventions that avoid the risks associated with opioid-based pain relievers. NIDCR intramural scientists have uncovered a key role for a protein called cyclin-dependent kinase 5 (Cdk5) in pain signaling.[22] They showed that blocking Cdk5 blunted the activity of pain-sensing neurons in a mouse model, suggesting that targeting Cdk5 could offer a safer, non-opioid treatment for orofacial pain.

Intramural researchers uncover new mechanisms for COVID-19 infection

Since the pandemic began in early 2020, more than 1 million people in the United States have died from COVID-19. Although serious illness has significantly declined, an average of about 350 deaths occur daily. NIDCR intramural researchers are on the front lines of the fight against COVID-19 by uncovering the basic mechanisms of SARS-CoV-2 infection.

Research by one group indicates that an enzyme called GALNT1 might put the brakes on SARS-CoV-2 by interfering with the virus's spike protein. The virus needs its spike protein to enter and infect cells. Experiments in mammalian cells and fruit fly cells showed that GALNT1 impairs spike protein activity by loading it with bulky sugar molecules. Subsequent experiments using cells from the respiratory tracts of healthy volunteers suggested this mechanism could also be at play in humans. The scientists propose that the Alpha and Delta variants of the virus, which circulated in 2021, have mutations in the spike protein that may enable them to evade the braking effects of GALNT1, potentially helping explain their higher infectiousness. The even more infectious Omicron variant that began circulating in the fall of 2021 was not evaluated in the study, but it has the same mutation in its spike protein.

Another NIDCR research team uncovered clues as to why COVID-19 can cause taste loss. Our sense of taste is managed by several nerves in the head. These cranial nerves project from the brainstem to areas of the tongue, mouth, and throat, where they detect taste signals and relay them back to the brain. The scientists discovered that human cranial nerves are studded with protein "entry factors" used by SARS-CoV-2 to invade cells. According to the researchers, the presence of these entry factors might indicate that the virus infects our taste-sensing nerves, potentially leading to taste loss.

Budget Policy: The FY 2024 President's Budget estimate for this program is $77.1 million, an increase of $1.5 million or 2.0 percent compared to the FY 2023 Enacted level.

[21] pubmed.ncbi.nlm.nih.gov/34941394/
[22] pubmed.ncbi.nlm.nih.gov/35263573/

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 2024 President's Budget estimate for this program is $32.9 million, an increase of $0.6 million or 2.0 percent compared to the FY 2023 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
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	$501,231,000
Rescission				$0
2023	$513,191,000	$526,051,000	$526,769,000	$520,163,000
Rescission				$0
2024	$520,138,000			

[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	2023 Amount Authorized	FY 2023 Enacted	2024 Amount Authorized	FY 2024 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$520,138,000	Indefinite	$520,138,000
National Institute of Dental and Craniofacial Research	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$520,138,000		$520,138,000

NATIONAL INSTITUTES OF HEALTH

National Institute of Dental and Craniofacial Research

Amounts Available for Obligation [1]

(Dollars in Thousands)

Source of Funding	FY 2022 Final	FY 2023 Enacted	FY 2024 President's Budget
Appropriation	$501,231	$520,163	$520,138
OAR HIV/AIDS Transfers	-$24	-$25	$0
Subtotal, adjusted budget authority	$501,207	$520,138	$520,138
Unobligated balance, start of year	$0	$0	$0
Unobligated balance, end of year (carryover)	$0	$0	$0
Subtotal, adjusted budget authority	**$501,207**	**$520,138**	**$520,138**
Unobligated balance lapsing	-$24	$0	$0
Total obligations	$501,183	$520,138	$520,138

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2022 - $2,304 FY 2023 - $2,048 FY 2024 - $2,112

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

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

		FY 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
Total compensable workyears:				
	Full-time equivalent	252	252	0
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$208	$212	$4
	Average GM/GS grade	12.2	12.2	0.0
	Average GM/GS salary	$122	$124	$2
	Average salary, Commissioned Corps (42 U.S.C. 207)	$125	$127	$2
	Average salary of ungraded positions	$156	$160	$3
	OBJECT CLASSES	**FY 2023 Enacted**	**FY 2024 President's Budget**	**FY 2024 +/- FY 2023**
	Personnel Compensation			
11.1	Full-Time Permanent	$17,921	$18,899	$978
11.3	Other Than Full-Time Permanent	$13,005	$13,714	$709
11.5	Other Personnel Compensation	$1,040	$1,097	$57
11.7	Military Personnel	$365	$385	$20
11.8	Special Personnel Services Payments	$3,741	$3,946	$204
11.9	**Subtotal Personnel Compensation**	**$36,073**	**$38,041**	**$1,968**
12.1	Civilian Personnel Benefits	$12,180	$12,790	$610
12.2	Military Personnel Benefits	$119	$125	$6
13.0	Benefits to Former Personnel	$0	$0	$0
	Subtotal Pay Costs	**$48,372**	**$50,956**	**$2,584**
21.0	Travel & Transportation of Persons	$291	$298	$7
22.0	Transportation of Things	$76	$78	$2
23.1	Rental Payments to GSA	$0	$0	$0
23.2	Rental Payments to Others	$0	$0	$0
23.3	Communications, Utilities & Misc. Charges	$101	$103	$2
24.0	Printing & Reproduction	$20	$19	-$1
25.1	Consulting Services	$30,778	$31,402	$624
25.2	Other Services	$8,640	$7,770	-$870
25.3	Purchase of Goods and Services from Government Accounts	$31,493	$30,517	-$976
25.4	Operation & Maintenance of Facilities	$74	$74	$0
25.5	R&D Contracts	$5,770	$5,925	$155
25.6	Medical Care	$197	$205	$8
25.7	Operation & Maintenance of Equipment	$1,265	$1,295	$30
25.8	Subsistence & Support of Persons	$0	$0	$0
25.0	**Subtotal Other Contractual Services**	**$78,217**	**$77,189**	**-$1,028**
26.0	Supplies & Materials	$3,448	$3,531	$83
31.0	Equipment	$1,380	$1,413	$33
32.0	Land and Structures	$10	$10	$0
33.0	Investments & Loans	$0	$0	$0
41.0	Grants, Subsidies & Contributions	$388,223	$386,541	-$1,682
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	**$471,766**	**$469,182**	**-$2,584**
	Total Budget Authority by Object Class	**$520,138**	**$520,138**	**$0**

[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 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
Personnel Compensation			
Full-Time Permanent (11.1)	$17,921	$18,899	$978
Other Than Full-Time Permanent (11.3)	$13,005	$13,714	$709
Other Personnel Compensation (11.5)	$1,040	$1,097	$57
Military Personnel (11.7)	$365	$385	$20
Special Personnel Services Payments (11.8)	$3,741	$3,946	$204
Subtotal, Personnel Compensation (11.9)	**$36,073**	**$38,041**	**$1,968**
Civilian Personnel Benefits (12.1)	$12,180	$12,790	$610
Military Personnel Benefits (12.2)	$119	$125	$6
Benefits to Former Personnel (13.0)	$0	$0	$0
Subtotal Pay Costs	**$48,372**	**$50,956**	**$2,584**
Travel & Transportation of Persons (21.0)	$291	$298	$7
Transportation of Things (22.0)	$76	$78	$2
Rental Payments to Others (23.2)	$0	$0	$0
Communications, Utilities & Misc. Charges (23.3)	$101	$103	$2
Printing & Reproduction (24.0)	$20	$19	-$1
Other Contractual Services			
Consultant Services (25.1)	$30,778	$31,402	$624
Other Services (25.2)	$8,640	$7,770	-$870
Purchase of Goods and Services from Government Accounts (25.3)	$18,364	$17,389	-$976
Operation & Maintenance of Facilities (25.4)	$74	$74	$0
Operation & Maintenance of Equipment (25.7)	$1,265	$1,295	$30
Subsistence & Support of Persons (25.8)	$0	$0	$0
Subtotal Other Contractual Services	**$59,121**	**$57,929**	**-$1,191**
Supplies & Materials (26.0)	$3,448	$3,531	$83
Subtotal Non-Pay Costs	**$63,057**	**$61,959**	**-$1,098**
Total Administrative Costs	**$111,429**	**$112,915**	**$1,486**

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Full-Time Equivalent Employment (FTE)

Office	FY 2022 Final			FY 2023 Enacted			FY 2024 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:	136	1	137	143	1	144	143	1	144
Reimbursable:	10	-	10	10	-	10	10	-	10
Total:	146	1	147	153	1	154	153	1	154
Office of the Director									
Direct:	7	-	7	8	-	8	8	-	8
Total:	7	-	7	8	-	8	8	-	8
Office of Administrative Management									
Direct:	15	-	15	15	-	15	15	-	15
Total:	15	-	15	15	-	15	15	-	15
Office of Information Technology									
Direct:	8	-	8	8	-	8	8	-	8
Total:	8	-	8	8	-	8	8	-	8
Office of Science Policy and Analysis									
Direct:	4	1	5	5	1	6	5	1	6
Total:	4	1	5	5	1	6	5	1	6
Office of Communication and Health Education									
Direct:	7	-	7	8	-	8	8	-	8
Total:	7	-	7	8	-	8	8	-	8
Office of Clinical Trial Operations and Management									
Direct:	3	-	3	4	-	4	4	-	4
Total:	3	-	3	4	-	4	4	-	4
Division of Extramural Research									
Direct:	28	-	28	29	-	29	29	-	29
Total:	28	-	28	29	-	29	29	-	29
Total	237	2	239	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
2020	12.1
2021	12.1
2022	12.2
2023	12.2
2024	12.2

NATIONAL INSTITUTES OF HEALTH
National Institute of Dental and Craniofacial Research

Detail of Positions[1]

GRADE	FY 2022 Final	FY 2023 Enacted	FY 2024 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	$203,700	$207,774	$211,929
General Schedule			
GM/GS-15	16	17	17
GM/GS-14	25	27	27
GM/GS-13	42	44	44
GS-12	36	38	38
GS-11	8	10	10
GS-10	0	0	0
GS-9	10	11	11
GS-8	5	5	5
GS-7	4	5	5
GS-6	2	3	3
GS-5	0	0	0
GS-4	1	2	2
GS-3	1	1	1
GS-2	0	0	0
GS-1	0	0	0
Subtotal	150	163	163
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	2	2	2
Senior Grade	0	0	0
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	2	2	2
Ungraded	84	86	86
Total permanent positions	148	159	159
Total positions, end of year	237	252	252
Total full-time equivalent (FTE) employment, end of year	239	252	252
Average ES salary	$203,700	$207,774	$211,929
Average GM/GS grade	12.2	12.2	12.2
Average GM/GS salary	$119,648	$122,041	$124,482

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