National Institute of Dental and Craniofacial Research (NIDCR)

Mission: The National Institute of Dental and Craniofacial Research (NIDCR) aims to advance fundamental knowledge about dental, oral, and craniofacial (DOC) 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.

In carrying out this mission, NIDCR supports research on the biological links between the mouth and the rest of the body, uncovering important connections between oral diseases and chronic conditions. Understanding these critical links is essential for improving patient care and health outcomes. The institute also addresses public health challenges including caries, periodontal disease, and craniofacial birth defects, as well as related public health issues, such as dental and orofacial pain and opioid use, temporomandibular disorders (TMDs), and oral cancers.

Key Facts

Founded in 1948, NIDCR is the largest funder of oral health research in the world. NIDCR-supported research provides scientific knowledge underlying the oral health care practices of **~200,000** U.S. dental practitioners. In fiscal year 2023, NIDCR provided **63%** of all NIH's funding to dental schools and supported **82%** of NIH awardees who have dental or oral health-related degrees.

NIDCR's High Profile Initiatives

- ***Dental, Oral, and Craniofacial Tissue Regeneration Consortium (DOCTRC):*** Supports the early development of products to repair or restore craniofacial muscles, bones, and other tissues lost to illness or injury. Currently, 16 interdisciplinary projects are being supported. Most projects have received feedback from the FDA and 94% have patents issued or pending applications.
- ***National Dental Practice-Based Research Network (PBRN):*** Engages dental practitioners to conduct research that improves oral health care. Launched in 2005, the PBRN has enrolled over 75,000 participants to participate in 58 studies. Study data are available at no cost to researchers. Examples of ongoing studies: providing nicotine replacement therapy in dental practices, creating a dental implant registry, and informing evidence-based guidelines for use of antibiotics to treat periodontitis
- ***TMD Collaborative for Improving Patient-Centered Translational Research (TMD IMPACT):*** Aims to advance TMD basic and clinical research, research training, and translation to evidence-based treatments and improved clinical care via a national, interdisciplinary patient-centered research collaborative. TMDs, a set of complex, painful, and poorly understood conditions of the joint and surrounding tissues, affect 5-10% of the U.S. population and are twice as common in women. NIDCR funded nine TMD IMPACT planning grants to enable institutions to develop the necessary partnerships, infrastructure, and capabilities to fulfill the goals of the collaborative. In October 2024, NIDCR published a Notice of Funding Opportunity seeking applications to establish the TMD IMPACT collaborative.
- ***Advancing Head and Neck Cancer Early Detection Research (AHEAD):*** Aims to improve early detection of head and neck cancers, including HPV-associated cancers. Head and neck cancers are the sixth most common type of cancer worldwide. More than 65,000 people are diagnosed with these cancers in the U.S. each year. Projects are investigating techniques such as high-resolution imaging and tailored biomarkers. AHEAD investigators can also access resources such as the National Cancer Institute's Early Detection Research Network, a national hub supporting the discovery and validation of biomarkers for early cancer detection.
- ***Data-Driven Solutions (DDS) Hub:*** Centralized knowledgebase to facilitate the discovery and application of data-driven research in DOC sciences. The DDS Hub is responsive to the NIDCR Data Science Strategy Working Group's recommendations to establish a robust data infrastructure tailored for DOC research based in "FAIR" data principles, including the ethical artificial intelligence/machine learning-readiness of DOC research data.

NIDCR's Impactful Stories and Latest Advances

- ***Deciphering the code to the human face:*** Each year in the U.S., about 3% of infants are born with birth defects and about half involve the face or skull. NIDCR-supported researchers are investigating the causes of these dental, oral, and craniofacial anomalies and are working to find therapies and prevention strategies. NIDCR also supports the FaceBase data repository, which curates large datasets provided by the craniofacial research community, including high-throughput genetic, molecular, biological, imaging, and computational techniques.
- ***Opioid alternatives and pain research:*** NIDCR partners with the NIH Helping to End Addiction Long-term® (HEAL) Initiative®, to address oral complications caused by medications used to treat opioid use disorders. In addition, through the **Restoring Joint Health and Function to Reduce Pain (RE-JOIN) Consortium**, NIDCR supports interdisciplinary studies of sensory nerves in the TMD joint and seeks new ways to relieve pain and restore joint health.
- ***Integrating medical and dental care to support whole person health:*** NIDCR supported a clinical trial demonstrating that children's dental visits increased when primary care providers were trained to talk to parents about oral health, perform oral exams, and provide dental referrals during annual wellness checkups. This work underscores the value of integrating dental and medical care, which could help address untreated dental concerns.
- ***Advancing therapies for Sjögren's disease patients:*** Salivary glands can be disrupted by genetic diseases, certain medications, radiation treatment for head and neck cancers, and autoimmune disorders, like Sjögren's disease. Insufficient saliva can cause burning sensations in the mouth, persistent oral ulcers and increases the risk of tooth decay and infection. NIDCR researchers successfully used a gene therapy approach to restore salivary function in animals and in a pilot study in humans (currently being tested in a Phase I clinical trial). NIDCR researchers have also shown that an FDA-approved drug for rheumatoid arthritis (tofacitinib) can help regulate the aberrant immune response in salivary gland cells, opening new avenues to potential therapies.
- ***New hope for a rare disorder:*** Fragile bones, dark patches on the skin, and early puberty are indications of fibrous dysplasia or McCune-Albright syndrome, a rare disorder of the skeleton, skin, and endocrine system that can be painful and disabling. A recent NIDCR clinical trial conducted at the NIH Clinical Center demonstrated a medication, denosumab, improved the quality and strength of participants' bones. NIDCR researchers also developed a diagnostic blood test that is less invasive and better at predicting disease severity than existing methods.
- ***Predicting future tooth decay risk:*** Certain changes in the bacteria found in the oral microbiome are known to increase the risk of tooth decay. In a longitudinal study, researchers found that shifts in the oral microbiome associated with tooth decay can occur as early as three years before any clinical signs. This study provides critical insights into such risk factors that can be monitored in children prior to the onset of tooth decay.
- ***Improving oral health for patients with brittle teeth:*** Osteogenesis imperfecta (OI) is a rare genetic disorder, commonly known as brittle bone disease. A multicenter clinical trial, including a site at the NIH Clinical Center, examines the effectiveness of FDA-approved clear plastic aligners to improve dental function in patients with OI. Conventional braces or surgery are not typically helpful for people with OI due to complex misalignments and fragile teeth. The trial aims to improve tooth alignment and chewing ability for patients with OI.

How NIDCR Strengthens the Future Oral Health Workforce

- ***Patient-oriented clinical research experiences in dental schools:*** The **Practice-based Research Integrating Multidisciplinary Experiences in Dental Schools (PRIMED)** initiative provides dental students and faculty with opportunities focused on developing clinical research skills, mentoring, and institutional collaboration. This complements the National Dental PBRN, which provides similar opportunities for dentists.
- ***Investing in the scholarship of dental public health:*** NIDCR sponsors a three-year Dental Public Health Fellowship Research program. It includes an accredited 1-year residency in Dental Public Health followed by a 2-year Oral Health Research Fellowship.