



Science Advancement & Outreach
A DIVISION OF PETA

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**Inviting Comments and Suggestions on Topic Areas for the NIDCR Strategic Plan for
Fiscal Years 2027-2031**

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1: Dental, Oral, and Craniofacial (DOC) Research

To advance scientific discovery across the research continuum; foster innovation to prevent disease and promote health; and develop improved diagnostics, treatments, interventions, and cures.

There are substantial differences between humans and other animals in dental, oral, and craniofacial anatomy and biology. Tooth structure, bone healing, oral microbiomes, and immune responses (<https://pmc.ncbi.nlm.nih.gov/articles/PMC11482700/>) differ across species. Rodents have continuously growing, largely rootless incisors, unlike human incisors (<https://pmc.ncbi.nlm.nih.gov/articles/PMC7110795/>). Enamel and dentin also differ in composition (<https://pubmed.ncbi.nlm.nih.gov/29604387/>) and structure (<https://pmc.ncbi.nlm.nih.gov/articles/PMC6732185/>), which can affect the development of dental caries and responses to restorative biomaterials. Mice have faster bone turnover and shorter healing times than humans (<https://pmc.ncbi.nlm.nih.gov/articles/PMC3779631/>), affecting the translation of studies involving bone grafts and dental implants. The oral microbiome of mice differs substantially from that of humans (<https://pmc.ncbi.nlm.nih.gov/articles/PMC11484444/>), which is important for dental caries and periodontal disease given the multifactorial pathologies of both diseases. Methods used to induce periodontal disease in animals, including pathogen or lipopolysaccharide injection and molar ligation, are artificial and do not reflect chronic human periodontitis (<https://link.springer.com/article/10.1186/s12903-025-06398-0>).

Because of these limitations, we recommend that NIDCR's strategic plan explicitly state that NIDCR will not conduct or fund DOC research that uses other animals and will focus exclusively on non-animal, human-based research approaches to improve early diagnosis, advance understanding of disease mechanisms and contributing factors, and accelerate the development of safe and effective treatments.

Advanced human cell-based models can recapitulate key features of human tissues and DOC diseases. For example, researchers developed a gingiva-on-chip system that mimics the human gingival microenvironment and could be used to study periodontal disease, gingival inflammation, and oral mucosal ulcers

(<https://advanced.onlinelibrary.wiley.com/doi/10.1002/adhm.202301472>). Scientists used patient-derived organoids to reveal hidden subtypes of oral cancer, opening new paths to targeted treatments

(<https://www.sciencedirect.com/science/article/pii/S2666379125002022>). AI can improve detection and diagnosis of oral pathologies, including caries and gingivitis

(<https://www.nature.com/articles/s41405-025-00336-6>) and oral cancer

(<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0273508>).

NIDCR has already begun investing in promising non-animal approaches, including the Human Oral Microbiome Database (<https://www.homd.org/>) and sequencing studies using cells collected from the mucosal tissue of people with and without severe periodontitis ([https://www.cell.com/cell/fulltext/S0092-8674\(21\)00630-9](https://www.cell.com/cell/fulltext/S0092-8674(21)00630-9)). While this is a great start, it is not clear that NIDCR is diverting funds from animal experimentation to fully support them.

3: DOC Research Capacity

To strengthen and sustain a robust, interdisciplinary research workforce, and enhance the infrastructure, tools, and resources needed to support high-quality research.

To strengthen and sustain a robust interdisciplinary research workforce and enhance current infrastructure needed to support gold standard science, NIDCR's strategic plan should commit to ending funding of animal-based infrastructure and expanding investment in non-animal research infrastructure, for both their intramural and extramural programs. Redirecting resources toward human-based research tools will accelerate biomedical innovation, create new scientific career opportunities, improve research efficiency, and advance human DOC health.

Most federally funded researchers receive training in animal-based methods and have limited exposure to advanced human-based technologies for DOC research. Transitioning to human-based approaches often requires retraining, new laboratory equipment, and access to interdisciplinary expertise, making the transition time- and resource-intensive. Additionally, given NIH's commitment to prioritizing human-based approaches (<https://www.nih.gov/news-events/news-releases/nih-prioritize-human-based-research-technologies>; <https://www.nih.gov/news-events/news-releases/nih-invests-150-million-human-based-research-reduce-use-animal-models>), NIDCR should provide greater support for researchers interested in making this transition.

We recommend that NIDCR's Research Training and Career Development Branch:

- Create funding mechanisms to help laboratories transition from animal use to animal-free technologies.
- Develop fellowships (F30, F31, F32, F33), career development awards (K01, K02, K08, K23, K25), and career transition awards for individuals focused on animal-free methodologies.
- Partner with research institutions to create Institutional T32 and T90 awards specifically for predoctoral and postdoctoral research training programs in non-animal methods.

Together, these investments would build the infrastructure, expertise, and workforce needed to establish non-animal, human-based approaches as the focus of NIDCR's DOC research enterprise and strengthen its ability to fulfill the Institute's mission of improving dental, oral, and craniofacial health.

4: DOC Research Operations

To improve the management and conduct of research through effective stewardship, data-driven decision-making, transparency, and accountability to enhance public trust.

For NIDCR to meet its objective of enhancing public trust through effective stewardship, data-driven decision-making, transparency, and accountability, the strategic plan should include a commitment to quantitatively track and publicly report 1) the number of animals used in NIDCR-supported research and what they are used for, and 2) how NIDCR funding is allocated between animal and human-based research, as well as 3) perform systematic reviews of NIDCR's research portfolio to guide funding decisions.

The Government Accountability Office's 2019 report on animal use in research (<https://www.gao.gov/products/gao-19-629>) recommended that federal agencies track metrics to monitor progress in reducing animal use and report that progress publicly. NIH's announcement prioritizing human-based methods also stated that it would "publicly report on research spending annually to measure progress toward reduction of funding for animal studies and an increase in funding for human-based approaches." While this commitment has yet to come to fruition, NIDCR can act by incorporating transparent tracking and public reporting of research spending on animal and non-animal approaches into its strategic plan. Tracking spending and animal use would provide a measurable benchmark for modernizing DOC research and could serve as a model for other NIH Institutes and Centers to follow, thereby advancing NIH's mission.

Given the evidence that experiments on animals often fail to recapitulate human disease biology, NIDCR should conduct or commission systematic reviews of the animal models it

uses and funds in each disease area. These reviews could identify models that fail to reflect human biology and should be discontinued, while also preventing unnecessary duplication and poorly designed studies (<https://brill.com/edcollbook-ooa/title/35072>). Resources for conducting systematic reviews are provided by NIH (<https://www.nihlibrary.nih.gov/services/evidence-synthesis>). By systematically evaluating the validity and relevance of animal experiments, NIDCR can identify where animal use must be ended first, with the goal of ending it entirely, and ensure that limited publicly funded resources are redirected toward high-quality, human-relevant non-animal approaches.

Federally funded research should serve the American public. NIDCR has a responsibility to ensure that public funds support research capable of producing robust, translatable outcomes for DOC diseases. Transparent tracking of animal use and research spending, combined with systematic evaluation of NIDCR's research portfolio, would provide the accountability and evidence needed to reduce and eliminate experiments on animals and redirect resources toward innovative human-based approaches. These measures would help NIDCR advance gold standard science, meet the goals of the administration and the public, and improve DOC health in ways that best serve the public.