Overview of Upcoming NIDCR Initiatives

*Harvard School of Dental Medicine Virtual Alumni Day*

Rena N. D’Souza, DDS, MS, PhD
Director, NIDCR

*June 4, 2021*
My Journey as a Clinician – Scientist

- A sense of intellectual curiosity
- Interest in using clinical questions (derived from chair side experiences) to drive scientific inquiry and the translation of discovery into practice
- A passion for mentoring and the dissemination of knowledge
- A commitment to the development of human potential
- A calling and the drive to make a difference
Precision medicine: Beyond the inflection point

NIH Mission

To seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.
NIH: Largest Funder of Biomedical Research

NIH supports institutions & people
(Extramural Research)

> 4,000 institutions, small businesses
> 300,000 scientists & research personnel
~ 80% of the NIH budget

NIH is an institution
(Intramural Research)

~ 6,000 scientists
~ 10% of NIH budget
~ 1,500 active trials
Clinical Research Center
FY2021 Appropriations:
- NIH: $42.9B (3% increase from FY2020)
- NIDCR: $484.9M (1.6% increase from FY2020)

~80% used for extramural research

770+ grants funded
200+ funded Institutions

6,500+ supported researchers
350+ trainees

~15% used for intramural research

20+ active clinical trials
3,300+ outpatient visits per year

5 research areas
27 Investigators
• Statutory Authority - SEC. 453 [285h] Public Law 80-755
  – The general purpose of the National Institute of Dental Research is the conduct and support of research, training, health information dissemination, and other programs with respect to the cause, prevention, and methods of diagnosis and treatment of dental and oral diseases and conditions.

• The 1998 Omnibus Consolidated and Emergency Supplemental Appropriations Act
  – Changed the name to NIDCR
  – Did not include an amendment to change the name in this statute – instead there are footnotes indicating this change
Forging a Path Forward

- Builds upon previous Strategic Plan preliminary work
- Meetings, workshops, breakout groups of NIDCR Executive Staff from across NIDCR
- Key input from Extramural, Intramural, Training and Workforce Development
- Council “Zoominar”
73 Years of Inspired Research

Today – with engagement from stakeholders– we continue to aspire to transform human lives through scientific discoveries and innovations that advance dental, oral, and craniofacial health and overall well-being for all
We advance fundamental knowledge about dental, oral, and craniofacial tissues in health and disease and translate these findings into prevention, early diagnosis, and treatment strategies that improve overall health for all individuals and communities across the life span.
Guiding Principles

• Scientific Excellence

• Diversity, Equity, & Inclusion

• Stewardship

• Embracing and Managing Change
Strategic Priorities

- Advance a cross-disciplinary and innovative research portfolio that characterizes the cellular and molecular determinants of DOC diseases, both unique and shared with other systems.

- Establish a foundation of scientific knowledge that can be used to develop precise and patient-centered approaches to detect, prevent, and treat DOC diseases.

- Support implementation research that uses evidence-based health interventions to identify and eliminate access and treatment inequities that adversely impact DOC health.

- Ensure that a diverse and vibrant DOC scientific community is nurtured and sustained for the future by an organizational infrastructure and culture that is inclusive, respectful, and free of systemic racism and biases.

- Leverage partnerships that advance the NIDCR research enterprise and increase its reach and impact.
• Coming in June:
  – Request for public input on proposed Strategic Plan outline and priority areas

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Late 2021/Early 2022
Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.

– Marie Curie
Latest updates:

- Large clinical trial to study repurposed drugs to treat COVID-19 symptoms
- NIH clinical trial evaluating Moderna COVID-19 variant vaccine begins
- NIH starting enrollment for third trial of blood clotting treatments for COVID-19

https://www.nih.gov/research-training/medical-research-initiatives/activ

The NIH ACTIV public-private partnership is prioritizing and speeding development of the most promising treatments and vaccines.
NIH RADx: Rapid Acceleration Of Diagnostics

- NIH-funded COVID-19 testing initiative aims to safely return children to in-person school
- CDC and NIH bring COVID-19 self-testing to residents in two locales
- NIH-funded COVID-19 home test is first to receive over-the-counter authorization from FDA
- NIH expands research to improve COVID-19 testing among underserved and vulnerable populations

NIH launched the RADx initiative to speed innovation in the development, commercialization, and implementation of technologies for COVID-19 testing. NIDCR administers six RADx awards including:

- A “smart mask” that changes colors
- A breathalyzer for direct detection
- Cheap, fast, point-of-care biosensors
2021 NIH-wide COVID-19 Strategic Plan

NIDCR Rises to COVID-19 Challenge

**Perspective**

40 Weeks In: A Look at How One NIH Institute Handled the Unimaginable

R. D’Souza¹, J.S. Lee¹, L. Shum², and M. Hoffman³

**Keywords:** COVID-19, coronavirus, infectious disease, decision making, public health, SARS-CoV-2

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**Commentary**

**Guest Editorial**

Leaving no stone unturned: The National Institute of Dental and Craniofacial Research’s scientific response to COVID-19

Rena N. D’Souza, DDS, MS, PhD; Lillian Shum, PhD

*JADA, April 23, 2021*
To date, NIDCR has funded approximately $4M of immediate, high impact research to ensure safety in dental practices during the COVID-19 pandemic.

Study topics include:

– Personal protective equipment (PPE) use in dental settings
– Aerosol and droplet transmission in dental settings
– Acceptance and usability of teledentistry
– Oral health care and access for low-income urban families
– COVID-19 vaccine readiness among dentists

For more information please visit: www.nidcr.nih.gov/research/covid19
Pioneering COVID-19 Research at NIDCR

- NIDCR researcher Blake Warner discovered SARS-CoV-2 cells in the mouth.
- May explain why the virus infects multiple areas of the body and might help explain the wide-ranging symptoms experienced by COVID-19 patients, including loss of taste and smell.

- NIDCR’s Peter Burbelo realized he could adapt an antibody-detecting method and applied it to the study and detection of the novel coronavirus, SARS-CoV-2.

Extramural Portfolio

Turning Discoveries to Dental, Oral, and Craniofacial Health

Disease Areas
Dental Diseases: Caries, Periodontal diseases, Dental anomalies
Oral Diseases: Oral cancers & mucosal diseases, Sjogren’s Syndrome & salivary gland dysfunctions, Oral complications of systemic conditions
Craniofacial Disorders: Craniofacial anomalies, Temporomandibular joint disorder & orofacial pain

Disease Spectrum
Prevention ------------ Detection ------------ Diagnosis ------------ Management/Treatment

Cross-cutting Approaches
Basic ------------ Translational ------------ Clinical ------------ Community and Practice

Scientific Disciplines
Workforce development  Microbiology  Neuroscience  Behavioral & social science  Implementation
Data science  Genetics  Immunology  Restoration & regeneration  Epidemiology  Health disparities
Cell & molecular biology  Developmental biology  Musculoskeletal biology  Imaging  Technologies
In FY 2020:
- Of all NIDCR extramural funding, approximately **47%** went to Dental Schools
  - ~53% went to other types of Institutions (Medical Schools, Hospitals, etc.)
- Of all NIH funding to Dental Schools, approximately **67%** came from NIDCR
  - ~33% came from other NIH ICOs
Intramural Research Areas

**Craniofacial Developmental, Cell and Matrix Biology**
Exploring the mechanisms of tissue morphogenesis, cellular function, differentiation, and cancer to prevent and treat craniofacial disorders.

**Epithelial and Salivary Gland Biology and Dysfunction**
Investigating mechanisms underlying development, differentiation, and secretory physiology to regenerate function.

**Immunology and Inflammation**
Research on mucosal immunology, oral inflammatory diseases, and immune tolerance/autoimmunity.

**Sensory Biology**
Investigating mechanisms of sensation including taste, somatosensation, and pain to develop strategies to control pain.

**Skeletal Biology**
Development and maintenance of teeth, bone, cartilage, their associated tissues, with emphasis on their cells, genes, matrix, and proteases.
National Dental Practice-Based Research Network

Engaging practitioners to generate the evidence base to improve precision health care

- **15 years** of continuous support
- **7,000** practitioner members, all 50 states
- **60,000** participants enrolled and over **58** studies

**New phase** (2019-2026)

- Administrative & Resource Center (Alabama) & Coordinating Center (Kaiser Permanente)
- 6 regional nodes & 1 specialty dentistry node
- Will support multiple clinical studies and trials involving practitioners and consenting patients
- Supported variety of COVID-19 dental studies
FaceBase: A Resource for Craniofacial Researchers

• Provide web interfaces for streamlined data submission, curation, sharing, browsing, and integration.
• Established in 2009 with a data hub-research spokes model, FaceBase is now a central data hub receiving data from the broad scientific community and sharing the data publicly.

Current focus:
• Expansion of volume, dimension, and diversity of data, with prioritization driven by community input.
• Technical enhancements to ensure a robust, comprehensive user experience.
• Fostering a diverse community of FaceBase researchers.
• Emphasizing collaboration, data crowdsourcing, FAIR-informed data crosslinking and curation—features crucial for biomedical and health disparity research.

Data Statistics Summary
- ~1,000 datasets (16 terabytes)
- 25,000+ images
- 4,200+ sequencing assays
- 2,270+ genome browser tracks
- Over a dozen human syndromes with craniofacial traits
- Ethnic and international diversities
Dental, Oral, and Craniofacial Tissue Regeneration Consortium (DOCTR-C)

Goal: to develop effective clinically-applicable strategies for regeneration of functional tissues of the human dental, oral and craniofacial complex

- Currently funding two resources centers that support a diversity of IND/IDE-enabling interdisciplinary translational projects, for example:
  - Bioresorbable bone adhesive for dental implants
  - Including local acting non-opioid medication received funding from NIH HEAL (Helping to End Addiction Long-termSM) Initiative
• Formed in response to National Academies’ study: "Temporomandibular Disorders: Priorities for Research and Care" – Supported by NIDCR and NIH OD

• Working Group Co-Chairs:
  – Clark Stanford, DDS, PhD – NIDCR Council
  – Bruce Rosen, MD, PhD – NIBIB Council
  – Christin Veasley – NINDS Council

• The Working Group will present a road map of prioritized research strategies to Council in 2021
From Idea to Funding Opportunity

Conceptualize an idea; need assessment
Program Officer assesses knowledge gaps and research opportunities:
- Portfolio analysis of overall landscape
- Literature
- Conferences, workshops, meetings
- Grant applications
- Grant progress
- Input from research community
- Discussion with NIH colleagues
- Special reports

Vet, shape, and refine concept internally
Internal discussion:
- Branch, Division, and Executive Staff level
- Determine objectives, feasibility, timeliness, portfolio balance, expected outcome, alignment with various Strategic Plans
- Assess level of interest, seek potential collaborations, and leverage resources at other Institutes

Deliberate and approve by NIDCR Council
Program Officer seeks Concept Clearance:
- Two to three Council members assigned to review
- Program Officer presents concept at open session
- Council members deliberate the merits of the concept
- Council members vote to approve, disapprove, or table the concept

Solicit public comments for initiative
Approved concepts posted on NIDCR website for 30-day comment period:
- Individuals
- Professional organizations

Develop Funding Opportunity Announcement
Program Officer develops FOAs:
- Request for Applications (RFA), Program Announcements (PA, PAR), Notices of Special Interests (NOSI)
- Optimize scope of work, mechanisms of support, time and budget, readiness of research community, locus of review, and availability of funds
- Formalize co-funding with others

Fairness
Robustness
Transparency
Transparency
Strategy

✓ We value your input and engagement in this process
NIDCR May Council Concept Clearances

Research
• Conducting dental practice-based research in dental schools to provide clinical research experience and educational opportunities

Training
• Transformative approaches to developing a dentist scientist clinical research workforce
• Mentored career development award to promote diversity in the dental, oral, and craniofacial research workforce
• Dual degree dentist scientist pathway to independence award
• Dentist scientist career transition award for intramural investigators
Helping to End Addiction Long-term (HEAL) Initiative

• Trans-NIH research initiative to stem the national opioid public health crisis by:
  – Improving prevention and treatment strategies for opioid misuse and addiction
  – Understanding, managing, and treating pain
• In coordination with the HHS Secretary, Surgeon General, federal partners, local government officials and communities
• NIDCR has signed on to ~20 NIH HEAL FOAs

NIDCR is co-leading an initiative on myofascial pain (such as temporomandibular joint disorders), including a recent workshop and planned funding opportunities
The NIH Blueprint for Neuroscience Research

• Seeks to accelerate transformative discoveries in brain function in health, aging, and disease

• Collaborative framework includes NIH Office of the Director and 14 NIH ICs that support research on the nervous system

• Supports cross-cutting neuroscience activities like research training, workforce diversity, therapeutic development, and research initiatives

• Initiatives NIDCR is participating in:
  – Blueprint Neurotherapeutics Network (BPN): Biologic-based Drug Discovery and Development for Disorders of the Nervous System
  – Blueprint for Neuroscience Research: Tools and Technologies to Explore Nervous System Biomolecular Condensates
  – Blueprint for Neuroscience Research: Functional Neural Circuits of Interoception
Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN)

Revolutionizing our understanding of the human brain

- Development and application of innovative technologies, including next generation human brain imaging technologies.
- Generate unprecedented insight into brain dynamics to show how individual cells and complex neural circuits interact in both time and space.
- NIDCR does not formally participate with the BRAIN Initiative; however, we are a participating institute on select funding opportunities.
Cancer Moonshot: Accelerating Progress in Cancer Research

- Development of biomarkers, technology and preclinical models
- Data sharing, analytics and predictive computational modeling
- Collaborations, public-private partnerships

- NIDCR collaborates on the Immuno-Oncology Translational Network (IOTN) to accelerate adult immuno-oncology research
- Within the IOTN Program, NIDCR leverages Cancer Moonshot funding and co-funds four awards on head and neck cancer: three focused on immunotherapy and one focused on immunoprevention
NIH Common Fund:
High Risk, Innovative Catalytic Research

• Programs that address emerging trans-NIH scientific opportunities:
  – **Transformative**: High potential to dramatically affect research
  – **Catalytic**: Meet set of high impact goals within set period of time
  – **Synergistic**: Outcomes promote and advance individual missions of NIH ICs to benefit health
  – **Cross-cutting**: Cut across missions of multiple NIH ICs, relevant to multiple diseases or conditions, and sufficiently complex
  – **Unique**: Something no other entity is likely or able to do

NIDCR co-leads the Glycoscience Program and participates in:
• **Gabriella Miller Kids First (Kids First)**
• **Knockout Mouse Phenotyping Program (KOMP2)**
• **Science of Behavior Change Program**
Solving the Major Disease Puzzles of our Times

If successful, AMP will:

- Discover and validate new targets that companies can incorporate into their therapeutic development programs
- Provide new insights into known, existing targets
- Enable a significant increase in our knowledge of tractable disease biology and disease pathways
- Create a rich, comprehensive, integrated knowledgebase that is easy to use and available to the entire global research community

...for major common diseases.
Accelerating Medicines Partnership
Autoimmune and Immune-Mediated Diseases (AIM)

- RA
- Lupus
- Psoriasis
- Psoriatic Arthritis
- Sjögren's Syndrome

Potential Buy-Ups:
Atopic Dermatitis, axSpA, Scleroderma

FNIH
NIH
National Institute of Dental and Craniofacial Research
The NIH UNITE Initiative

- Events of the past year have brought into sharp relief the ongoing reality of racial injustice in our country, and the responsibility of all of us to address this issue.

- We must ensure that biomedical research, and the administrative system that supports it, is devoid of hostility grounded in race, sex, and other federally protected characteristics.

- In this new initiative, we are committed to delineate elements that may perpetuate structural racism in biomedical research both within NIH and the extramural community leading to a lack of personnel inclusiveness, equity, and diversity.
The Groundwater Approach

- Racial Inequity looks the same across systems
- Socio-economic differences do not explain racial inequities
- Inequities are caused by systems, regardless of people’s culture or behaviors

“The Groundwater Approach: building a practical understanding of structural racism” by Bayard Love and Deena Hayes-Greene of the Racial Equity Institute
Challenge is Clear

Figure. Representation of Black and Hispanic Individuals in the Health Care Workforce and Health Care Profession Graduates in 2019

The NIH UNITE Initiative to Strengthen Diversity and Inclusion: Together, We’re Stronger

NIDCR Director’s Statement on Structural Racism

March 1, 2021

There is no place for structural racism in biomedical research.

The UNITE initiative was established to identify and address structural racism within the NIH-supported and the greater scientific community.
NIDCR Extramural Training Diversity Opportunities

NIDCR supports a broad range of funding opportunities and training models to provide multiple pathways for individuals from groups underrepresented in biomedical research to obtain research and career development experiences.

**Initial support to develop skills and knowledge:**
- Administrative supplements to existing grants to support candidate’s research experience
- Institutional awards – Program Director recruits and appoints individuals for research and career development experiences or opportunities for mentorship in structured programs

**Investigator - initiated funding opportunities to support early independence**
- Mentored research training and career development guides investigator’s research career
- Administrative supplements to existing grants supports continuity in research
- Awards for investigators in low resourced/minority serving institutions develops research capacity
NIDCR Extramural Training Diversity Opportunities

NIDCR
• Predoctoral to Postdoctoral F99/K00 Transition Award to Promote Diversity
• Mentored K01 Career Development Awards
  – Diversity and re-entry

NIH – Administrative Research Supplements to Existing Grants
• Diversity and re-entry in health-related research
• Diversity in Research and Development Small Businesses-SBIR/STTR
• Diversity in the HEAL Initiative
Fogarty International Center (FIC)

- Institutional Training: Chronic, Non-Communicable Diseases and Disorders Across the Lifespan (D43); and Global Health Scholars and Fellows (D43)
- Emerging Global Leaders Award (K43)

Office of Research on Women’s Health (ORWH)

- Administrative Supplements: to Promote Research Continuity and Retention of NIH Mentored Career Development (K) Award Recipients and Scholars; and for Continuity of Biomedical and Behavioral Research Among First-Time Recipients of NIH Research Project Grant Awards
- Building Interdisciplinary Research Careers in Women’s Health (BIRCWH) (K12)
AADR Mentoring an Inclusive Network for a Diverse Workforce of the Future (AADR MIND the Future)

- NIDCR supported
- Mentoring network for diverse pool of early career investigators in dental, oral and craniofacial research
- Fosters retention and career advancement of postdoctoral scientists and junior faculty
- Develops professional skills and provides a mentored grant writing experience
- Increase diversity of the NIDCR research workforce

https://www.iadr.org/AADR/MIND-the-Future
EDI Public-Private Partnership Taskforce

- Develop substantive mechanisms to significantly increase participation of individuals from underrepresented groups at every level of the dental, oral, and craniofacial biomedical research training pipeline.

- Includes diverse professional organizations and industry partners

- We will be reaching out to additional stakeholders as we progress
Virtual Side Event
on the occasion of the 74th WHO World Health Assembly

Integrating Oral Health into Global Health:
Vision and Roadmap for 2030

Wednesday 26 May 2021
11:30-13:00 EDT
17:30-19:00 CET
21:00-22:30 IST

Register » dental.nyu.edu/oralhealthsideevent