National Institute of Dental and Craniofacial Research

Research Investments & Advances

Discover how NIDCR-funded research is enhancing knowledge and improving public health.

Temporomandibular Disorders

Overview

Temporomandibular disorders (TMDs) are a set of more than 30 conditions that cause pain and affect the function of the temporomandibular (jaw) joint and surrounding tissues. An estimated 5% –10% of the U.S. population has some form of TMD. These conditions are twice as common in women than in men. TMDs can occur alone, or with other medical conditions, such as fibromyalgia, back pain, migraine, irritable bowel syndrome, and arthritis. Common symptoms of TMDs may include pain in the chewing muscles, jaw joint, neck, and/or face, as well as jaw stiffness and painful clicking in the jaw joint when opening or closing the mouth. TMDs can have a serious impact on quality of life. Pain in many cases may be so severe that it results in loss of function in eating, chewing, and talking.

Why Is Research on TMDs Important?

TMDs include a range of conditions that affect muscle and bone, resulting in pain and disability. They are the second most common musculoskeletal condition after chronic low-back pain. While injury to the temporomandibular joint (TMJ) or muscles used for chewing can lead to some TMDs, in most cases the exact cause is not clear. Research suggests a combination of genes, psychological and life stressors, and how someone perceives pain, may play a part in why someone develops a TMD and whether it will be long-lasting.

There is not a broadly accepted standard test available to diagnose the wide range of TMDs affecting Americans across the country. Because the exact causes and symptoms are not always clear, identifying these disorders can be difficult. This means that patients with TMDs are often misdiagnosed or receive delayed or ineffective treatment. To understand and effectively treat this set of complex conditions, a coordinated, multilevel, and patient-focused approach is needed.

How Is NIDCR Investing in Research on TMDs?

NIDCR invested over $12 million in research on TMDs in fiscal year 2024.

NIDCR is committed to advancing research on TMDs and pain to ultimately improve care and treatment for patients with these conditions.

Examples of NIDCR-supported Research Projects

- **Analyzing mechanical behavior of the TMJ.** Scientists are modeling how the TMJ moves and functions under different physical forces to gain a deeper understanding of how forces acting on joints contribute to TMDs.
- **Developing non-opioid, non-addictive therapeutics.** Scientists are engineering an antibody with improved affinity and increased tissue penetration that blocks pain-signaling pathways to address the need for better non-opioid pain therapies.
- **Discovering biomarkers associated with TMDs.** Scientists are identifying clinical, imaging, molecular, and biological biomarkers (disease indicators) associated with TMDs to precisely predict disease progression and help clinicians develop more effective treatment strategies for TMDs.
- **Engineering TMJ discs.** Researchers are using combinations of bioactive scaffolds, biomolecules, and cells to engineer grafts aimed at regenerating or replacing damaged or degenerated TMJ discs (cartilage that cushions the joint) to restore joint function.
- **Examining nutrition-based interventions to relieve TMD pain.** Investigators are studying derivatives of omega-3 polyunsaturated fatty acids found in fish, shellfish, and some plant oils that relieve pain and reduce inflammation as a potential dietary supplement for preventing and treating TMD pain.
- **Exploring nonpharmacological treatments.** Clinicians and researchers are evaluating noninvasive, low-level laser therapy in a clinical trial as a promising treatment in controlling TMD pain.
- **Generating new models for TMD research.** Investigators are developing animal models that mimic symptoms of human TMDs to study factors and molecular mechanisms underlying TMDs that will pave the way for improved diagnosis and treatment.
- **Investigating sex differences in TMD pain.** Researchers are studying sex-specific mechanisms of TMD pain that will lead to development of tailored therapies and improve pain management for women with TMDs.
- **Mapping neuronal connections to jaw joints.** Scientists are examining how changes in neuron networks affect joint degeneration, inflammation, and pain to support the development of better TMD treatments.
- **Personalizing treatment plans for TMD patients.** Clinicians and scientists are conducting a clinical trial to customize TMD treatment by closely monitoring patients' pain in real time, allowing for continual adjustments in treatment, while also tracking the long-term impact on pain management.
- **Understanding gut microbiome contributions to pain.** Scientists are advancing knowledge on how changes in gut bacteria influence pain signaling, shedding light on the gut-brain interactions that affect TMD pain.
- **Establishing the TMD Collaborative for IMproving PAtient-Centered Translational Research (TMD IMPACT).** In partnership with multiple NIH Institutes, Centers, and Offices, as well as the U.S. Food and Drug Administration, NIDCR established TMD IMPACT with the goal of advancing TMD research, research training, and translation to evidence-based treatments and improved clinical care.

Learn more about NIDCR's research investments and advances in HPV and oropharyngeal cancer, oral health and opioids, regenerative medicine and more at:

www.nidcr.nih.gov/grants-funding/funded-research/research-investments-advances

Last Reviewed: December 2025