2024 BRA
Dr. Iacopo Cioffi, University of Toronto, Faculty of Dentistry

Dr. Iacopo Cioffi is a full-time tenured Associate Professor at the University of Toronto's Faculty of Dentistry. He is a clinician-scientist with expertise in temporomandibular disorders (TMD), functional anatomy of the masticatory system, and orthodontics and dentofacial orthopedics. He was trained in dentistry, orthodontics, and TMD at Universita' di Napoli Federico II, Italy, where he also completed a PhD program in oral sciences and a clinical specialty program in orthodontics. During his post-doctoral training, he also worked at the Clinic of Masticatory Disorders, Centre for Dental Medicine, at the University of Zurich (Switzerland), and the Department of Functional Anatomy at ACTA (Amsterdam, the Netherlands). He also completed the dental specialty training and assessment training program (DSATP, orthodontics) at the University of Toronto. Dr. Cioffi is a board-certified orthodontist and a Fellow of the Royal College of Dentists of Canada.

Dr. Cioffi co-directs the UofT Center for Multimodal Sensorimotor and Pain Research (http://painresearchcentre.org/), funded by the Ontario and the Federal Governments. Dr. Cioffi' s research focuses on masticatory muscle function and dysfunction, understanding mechanisms of orofacial pain, and developing neural and muscular biomarkers of TMD. Dr. Cioffi's work is unique in TMD research as it employs a multimodal approach, including neuromuscular imaging, behavioral measurements, and electrophysiological recordings, to investigate pathophysiological mechanisms of muscular TMD, and is particularly suitable to study the biopsychosocial determinants of pain comprehensively. Since 2015, Dr. Cioffi has contributed to secure more than 3 million dollars in research funding principal investigator or co-principal investigator from the Canadian Institutes of Health Research, the Government of Ontario, the American Academy of Orofacial Pain, the American Association of Orthodontists Foundation, the European Orthodontic Society, Align Technology, and UofT Dentistry.

Dr. Cioffi is actively involved in orthodontic and pain education. He teaches oral physiology, orofacial pain, TMD, and orthodontics. He is the course director of the graduate program "The diagnosis and management of TMD" (DEN1017) at UofT Dentistry and is the Faculty lead of the University of Toronto Centre for The Study of Pain Interfaculty Pain Curriculum. This extensive interprofessional curriculum involves more than a thousand UofT students each year across seven different health disciplines. He also coordinates the scientific methodology and Journal review courses in the graduate orthodontic program at UofT. In 2019, Dr. Cioffi was awarded the M.G. Bardner Memorial Award for exceptional orthodontic education.

Dr. Cioffi has authored > 60 manuscripts in the fields of TMD pathophysiology, pain, and orthodontics. Since 2015, he has performed more than 330 reviews for the American Journal of Orthodontics and Dentofacial Orthopedics, The Angle Orthodontist, the European Journal of Orthodontics, the Journal of Oral Rehabilitation, the Journal of Oral & Facial Pain and Headache, and many other dental, orthodontic, and pain journals. He is An Associated Editor of Orthodontics and Craniofacial Research and an editorial board member of the Journal of Oral Rehabilitation. Dr. Cioffi is actively involved in national and international scientific pain and

orthodontic research groups (International Association for Dental Research Neuroscience and INfORM -International Network for Orofacial Pain and Related Disorders Methodology- groups, and the Network for Canadian Oral Health Research orofacial pain working group). He also is an active member of the Edward H. Angle Society of Orthodontists (Eastern Chapter). Dr, Cioffi has been a speaker at many international conference organized by the International Association for the Study of Pain, the American Academy of Orofacial Pain, the International Association for Dental Research, the Canadian Pain Society, and the Angle Society East, and the American Association of Orthodontists. Dr. Cioffi's clinical activities are limited to clinical orthodontics and the management of patients with TMD.

Description of the project

Occlusal dysesthesia (OD), or phantom bite syndrome, is a poorly understood disorder characterized by abnormal orofacial sensory function. Individuals with OD report an altered bite sensation leading to discomfort and facial pain, while the clinical examination reveals no obvious finding. OD is thought to be a somatic symptom disorder (SSD)—a condition characterized by excessive focus on physical symptoms that may or may not be associated with a diagnosed medical state, and mainly occurs after dental procedures in individuals with elevated stress and anxiety levels. OD is one of the most challenging conditions to manage and exerts considerable personal suffering as individuals with OD have a long history of unsuccessful interventions. Although clinical features of OD have been described, we lack effective treatments, as mechanisms of OD remain unexplored.

This project aims to characterize, for the first time, and comprehensively, the biopsychosocial underpinnings of OD. Our research center has extensive expertise in investigating sensorimotor function and pain mechanisms. We have shown that individuals with increased trait anxiety and somatosensory amplification (SSA)—the tendency to experience bodily sensations as intense, noxious or disturbing, and consisting of hypervigilance to bodily sensations—have increased orofacial sensitivity and present an altered occlusal sensitivity—the ability to detect the smallest thickness between occluding teeth. Using fMRI, we also have characterized a novel brain circuit connecting the central nucleus of the amygdala (CeA)—which plays a crucial role in anxiety responses—to the motor nuclei of the trigeminal nerve (5M). This circuit may regulate the sensorimotor response to perceived changes in dental occlusion.

In this project we propose to identify and characterize dental, sensory, muscular, and neural abnormalities associated with OD. We will use quantitative sensory testing, brain MRI, bite sensors, and electromyography to characterize neural, dental, and muscular features in individuals with OD and sex- and age-matched controls.

OD, a condition seldom explored, is primarily encountered by dental specialists who modify dental occlusion, such as orthodontists and prosthodontists. This groundbreaking project will not only shed new light on this condition but also provide unprecedented mechanistic insights, thereby revolutionizing orthodontic education and our professional sphere.

My research lab has established a successful research program. Funding from AAOF has been instrumental to develop a solid and strategic research agenda, which major funding agencies now support.