International College of Prosthodontists
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Program Speaker – Yuka Abe

Title

Sleep Bruxism: A Novel Approach to Elucidate the Mechanism using a Disease-Specific iPSC-Based Model

Abstract

Sleep bruxism is classified as a sleep-related movement disorder characterized by grinding and clenching of the teeth during sleep. The mechanical stress of sleep bruxism is associated with poor prognosis of prosthodontic treatment and seriously compromises patients' quality of life. Although there is a consensus that several sources of causative factors are involved, little is known about the etiology of sleep bruxism. Our previous study found a significant association between sleep bruxism and single nucleotide polymorphism (SNP) rs6313 C>T in the serotonin (5-HT) 2A receptor gene (HTR2A), which suggested C allele carrier is associated with a 4.25-fold increased risk of sleep bruxism.
However, the effects of the sleep bruxism-associated variant on the function of these neurons have never been investigated, because of the limited accessibility to the brain. *In vitro* human disease models using disease-specific induced pluripotent stem cells (iPSCs) technology have the potential to provide dramatic progress in the elucidation of the pathogenic mechanism of various diseases. Thus, we have established a sleep bruxism patient-specific iPSC-based disease model in order to reveal the pathogenic mechanism of sleep bruxism.

First, we established iPSC lines from monocytes in peripheral blood samples of sleep bruxism patients with C/C genotype of rs6313 and age- and gender-matched controls with T/T genotype and then differentiated them to neurons that express *HTR2A* using the neurosphere culture system. Second, we produced lentiviral vectors, which is specific to *HTR2A* promoter, for labeling target neurons and then examined and compared the electrophysiological properties of iPSC-derived neurons expressing *HTR2A* between the sleep bruxism and control groups using whole-cell patch-clamp technique in order to elucidate neurological phenotype of sleep bruxism patient-specific iPSC-derived neurons.

In this lecture I will introduce the outline of the project and discuss the pathogenic mechanism of sleep bruxism based upon the results of this project.

Biography

Dr. Yuka Abe is Assistant Professor of the Department of Prosthodontics at Showa University School of Dentistry since 2017. Her research interests are etiology and management of sleep bruxism and oral health-related quality of life in oral rehabilitation. She received her DDS degree from Tokyo Medical and Dental University in 2006, and her PhD degree in prosthodontics in 2011. She was a visiting researcher from 2019 to 2021 at Orofacial Pain and Oral Medicine Center, Herman Ostrow School of Dentistry of

University of Southern California, where she joined researches on an automated diagnostic system construction based on machine learning and a web-based virtual learning environment (VLE).