Study identifies cells in gingivae that protect against periodontitis

By DTI

PHILADELPHIA, U.S./CHENGDU, China: Despite significant advancements in oral health care, periodontitis remains the most common cause of tooth loss, as well as the sixth most prevalent infectious disease worldwide. The discovery of a new type of cell in the epithelial tissue of the periodontium that helps protect against harmful bacteria has thus renewed interest in the notion that our immune systems may be key to this disease.

The study was conducted by researchers at the Monell Chemical Senses Center, a nonprofit independent scientific institute, working alongside scientists from Sichuan University in Chengdu in China. Examining the gingivae of mice, they found that solitary chemosensory cells (SCCs) were present and that they expressed several kinds of taste receptors as well as the protein gustducin. The role of SCCs is to sense any irritants and bacteria that are present, and they have previously been found in the urinary tract, the gut and the nasal cavities.

The researchers showed that, when gustducin and/or SCCs were genetically removed from the mice’s gingivae, pathogenic oral bacteria often quickly grew in numbers, leading to periodontitis. In contrast, the stimulation of the bitter taste receptors in SCCs was found to promote the production of antimicrobial molecules.

In general, mice without gustducin in their SCCs were found to have a more potentially harmful oral microbiome than those with gustducin present. Crucially, these differences in oral flora compositions were identified prior to the loss of any periodontal bone, implying that they could be regarded as a fore-runner to periodontitis and could be helpful in identifying it early.

“Our study adds to a growing list of tissues we now know contain SCCs and indicates that the common molecular pathways in gum SCCs are involved in the regulation of oral microbiota,” said Dr. Marco Tizzano, a researcher at Monell Chemical Senses Center and co-author of the study. “In the absence of taste signaling in the gums, the oral microbiome changed in mice without gustducin.”

Based on this study and other unpublished work relating to humans, the research team has suggested that periodontal SCCs in humans may play a similar regulatory role in regard to our own oral microbiomes.

The study, titled “Gingival solitary chemosensory cells are immune sentinels for periodontitis,” was published online on Oct. 3, 2019, in Nature Communications.