Medical Xpress

Microbiome analysis helps understand cause of chronic sinus condition, suggests cure

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A study of the microbiome of the human nose provides clues to the cause of a chronic sinus condition and potential strategy for a cure. Researchers from the University of California, San Francisco report their findings today at the 2012 General Meeting of the American Society for Microbiology.

Chronic rhinosinusitis (CRS) is characterized by inflammation of the nasal and paranasal sinuses lasting over 12 weeks. Patients suffering from this disease experience a variety of symptoms including congestion, fatigue, and even depression and it can lead to other conditions such as asthma, meningitis and aneurysms. Annually, it is estimated to be responsible for as many as 22 million office visits and more than 500,000 emergency department visits in the U.S. with healthcare costs reaching as high as $3.5 billion. The causes of chronic rhinosinusitis are not completely understood. This has hampered development of long-lasting, definitive treatments.

"With the fast-growing body of literature that demonstrates associations between the human microbiome composition and several diseases such as asthma and obesity, we hypothesized that a nasal microbiome exists and plays a role in CRS development," says Nabeetha Nagalingam, a researcher on the study.

In the study Nagalingam and colleagues compared the nasal microbial communities of 10 CRS patients and 10 healthy individuals. They found that patients with CRS had a depleted nasal microbiome, characterized

by a significant reduction in bacterial diversity and an overgrowth of one type of bacteria, Corynebacterium spp.

"We investigated our hypothesis that C. tuberculostearicum in the setting of a depleted microbiome can induce pathophysiology consistent with sinusitis using a mouse model," says Nagalingam.

To recreate a depleted microbiome, mice were administered antibiotics for 7 days before they were infected with C. tuberculostearicum. Mice who were given the antibiotic before exposure displayed symptoms of sinusitis. Mice that were not first treated with antibiotics but exposed to the bacteria did not.

"From our human microbiome comparative profiling, we noted that lactic acid bacteria, including Lactobacillus sakei, were significantly depleted in patients with CRS and postulated that this bacterium may have a protective role against CRS development," says Nagalingam. Once again using the mouse model they showed that L. sakei inhibited the growth of C. tuberculostearicum and could prevent infection, even with a depleted nasal microbiome.

"These findings suggest that manipulation of microbial communities to restore colonization by beneficial species identified in this study may represent a novel and efficacious approach for prevention or management of CRS," says Nagalingam.

More information: This research was presented as part of the 2012 General Meeting of the American Society for Microbiology held June 16-19, 2012 in San Francisco, California.

Provided by American Society for Microbiology