New findings detail how beneficial bacteria in the nose suppress pathogenic bacteria

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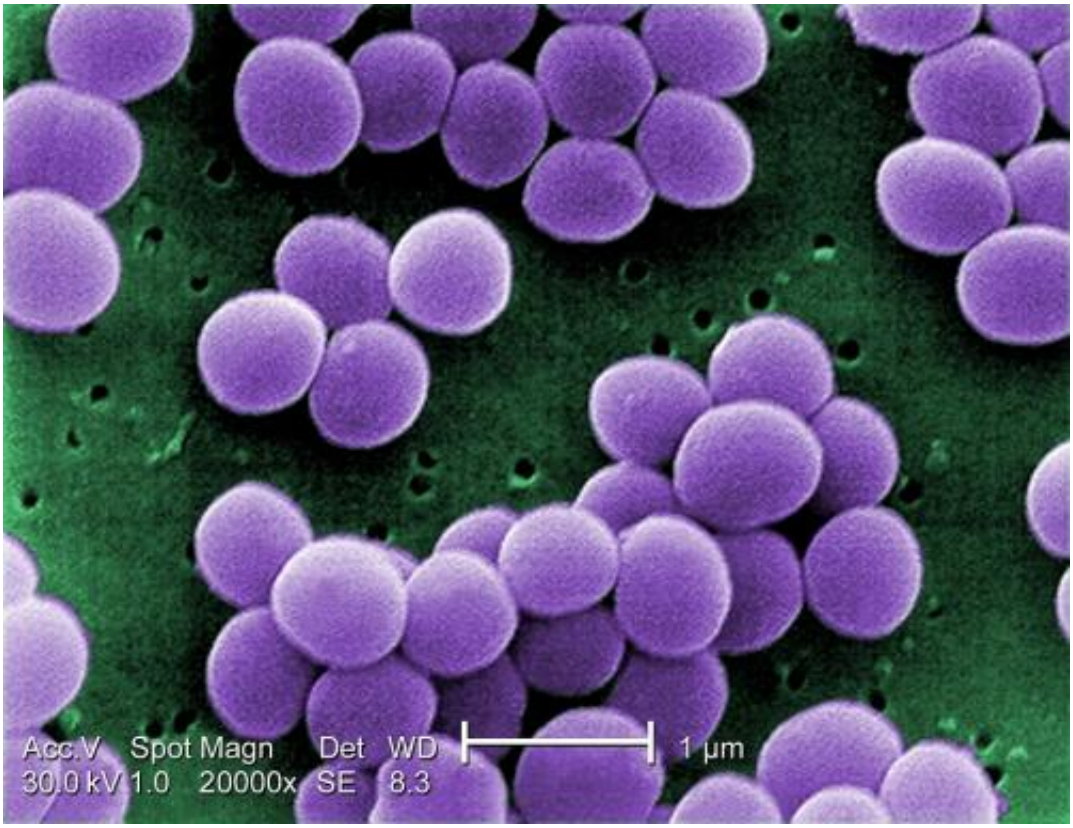

Scanning electron micrograph of S. aureus; false color added. Credit: CDC

Staphylococcus aureus is a common colonizer of the human body. Although, one quarter of the U.S. population live with the bacteria and never get sick, having *S. aureus* present in the nostrils is a risk for infections that range in severity from mild skin to life- threatening

MRSA infections. Research from the Forsyth Institute is providing insight into how harmless *Corynebacterium* species, bacterial members of the nasal and skin microbiome, help protect humans from disease.

A recent study by senior-author Katherine P. Lemon MD, PhD and first-author Matthew M. Ramsey PhD, along with Dr. Marcelo Freire at the Forsyth Institute, and with Rebecca Gabrilska and Dr. Kendra Rumbaugh from Texas Tech University, shows that when the two bacteria interact, *Corynebacterium* inhibits the virulence of *S. aureus*. Further understanding of these interactions is likely to help researchers to develop new treatments for preventing *S. aureus* infections. In addition, further research on the interactions between benign members of the human microbiome and bacteria, like *S. aureus*, that exhibit similar dual characteristics of living in harmony with and causing infections of humans, so-called pathobionts, could lead to the development of novel treatments for other diseases.

"Our research helps set the stage for the development of small molecules and, potentially, probiotic therapies for promoting health by actively managing nasal microbiome composition," says Lemon. "This research identifies a role for *Corynebacterium* species in suppressing *S. aureus* virulence, and is an exciting early stage in our exploration of the molecular mechanisms that sculpt the composition of the nasal microbiome and influence colonization by pathobionts. We look forward to an increase in research on commensal-pathobiont interactions within the human microbiome and an ever-increasing understanding of the significance of our beneficial bacteria partners."

In recent years, the emergence of an antibiotic resistant form of *S. aureus* infection (methicillin-resistance *S. aureus* or MRSA) has been a vexing problem. According to the Centers for Disease Control and Prevention, MRSA caused over 80,000 cases of invasive disease and over 10,000 deaths annually from 2005 through 2011. As more and

more species of bacteria become antibiotic resistant, a deeper understanding of the interactions between potentially helpful and harmful bacteria in our microbiomes offers new approaches for treating diseases by harnessing the functions of already-present "beneficial" bacteria. Because pathobiont colonization is a prerequisite for infection and transmission, a possible approach to prevent infections by bacteria such as *S. aureus* is to limit or decrease their abundance or to shift them towards harmless behavior using either compounds derived from benign/beneficial members of the microbiome or by using these beneficial bacteria themselves as probiotics.

The full paper, titled "*Staphylococcus aureus* shifts towards commensalism in response to *Corynebacterium* species" is available for download from the *Frontiers in Microbiology* website.

More information: Staphylococcus aureus shifts towards commensalism in response to Corynebacterium species, DOI: 10.3389/fmicb.2016.01230 , journal.frontiersin.org/articl … .2016.01230/abstract

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