

Scientists identify nutrient that helps prevent bacterial infection

January 15 2021



Colorized scanning electron micrograph showing carbapenem-resistant *Klebsiella pneumoniae* interacting with a human neutrophil Credit: NIAID

Scientists studying the body's natural defenses against bacterial infection have identified a nutrient—taurine—that helps the gut recall prior infections and kill invading bacteria, such as *Klebsiella pneumoniae* (*Kpn*). The finding, published in the journal *Cell* by scientists from five institutes of the National Institutes of Health, could aid efforts seeking alternatives to antibiotics.

Scientists know that microbiota—the trillions of beneficial microbes living harmoniously inside our gut—can protect people from bacterial infections, but little is known about how they provide protection. Scientists are studying the microbiota with an eye to finding or enhancing natural treatments to replace antibiotics, which harm microbiota and become less effective as bacteria develop [drug resistance](#).

The scientists observed that microbiota that had experienced prior infection and transferred to [germ-free mice](#) helped prevent infection with *Kpn*. They identified a class of bacteria—*Deltaproteobacteria*—involved in fighting these infections, and further analysis led them to identify taurine as the trigger for *Deltaproteobacteria* activity.

Taurine helps the body digest fats and oils and is found naturally in bile acids in the gut. The poisonous gas hydrogen sulfide is a byproduct of taurine. The scientists believe that low levels of taurine allow pathogens to colonize the gut, but high levels produce enough hydrogen sulfide to

prevent colonization. During the study, the researchers realized that a single mild infection is sufficient to prepare the microbiota to resist subsequent infection, and that the liver and gallbladder—which synthesize and store [bile acids](#) containing taurine—can develop long-term infection protection.



Colorized scanning electron micrograph showing carbapenem-resistant *Klebsiella pneumoniae* interacting with a human neutrophil. Credit: NIAID

The study found that taurine given to mice as a supplement in drinking water also prepared the microbiota to prevent infection. However, when mice drank water containing bismuth subsalicylate—a common over-the-counter drug used to treat diarrhea and upset stomach—[infection](#) protection waned because bismuth inhibits hydrogen sulfide production.

Scientists from NIH's National Institute of Allergy and Infectious Diseases led the project in collaboration with researchers from the National Institute of General Medical Sciences; the National Cancer Institute; the National Institute of Diabetes and Digestive and Kidney Diseases; and the National Human Genome Research Institute.

More information: A Stacy et al. Infection trains the host for microbiota-enhanced resistance to pathogens. *Cell*, [DOI: 10.1016/j.cell.2020.12.011](#) (2021).

Provided by NIH/National Institute of Allergy and Infectious Diseases

Citation: Scientists identify nutrient that helps prevent bacterial infection (2021, January 15) retrieved 27 April 2024 from <https://phys.org/news/2021-01-scientists-nutrient-bacterial-infection.html>

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