



Solution to Stubborn Bacterial Infections Might Be Sweet



CHEAP AND EFFECTIVE

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ENG STUDY: SUGAR COULD HELP FIGHT RECURRING INFECTIONS, TB

BY SUSAN SELIGSON

A DISCOVERY BY researchers at the College of Engineering may deliver a new weapon in the daunting battle against recurring, potentially lethal bacterial infections such as staphylococcus and streptococcus. And the weapon—a modified form of sugar—is as widely available and cheap as it is effective, says study coauthor James Collins, a William Fairfield Warren Distinguished Professor, an ENG professor of biomedical engineering, and a Howard Hughes Medical Institute investigator. The study appeared in a May issue of *Nature*.

“A spoonful of sugar makes the medicine work,” says the MacArthur genius award recipient, paraphrasing Mary Poppins. It does that, he says, by “waking up” stealthy, dormant bacteria that can lie in a state of metabolic hibernation for weeks or months. Collins and his team found that sugar dramatically boosts the effectiveness of so-called first-line antibiotics, such as streptomycin and tetracycline. They believe that a sugar-antibiotics combination could be used to wipe out recurring, often debilitating infections such as those of the ear, throat, lungs, and urinary tract, all of which can spread to the kidneys and other vital organs if left unchecked.

With the Harry Potter–esque name “persisters,” the class of particularly feisty bacteria commonly seems to respond



initially to antibiotic treatment, then goes into hiding, only to emerge weeks or months later more aggressive than they were initially. These infections take a huge toll; Collins’ own mother has been hospitalized several times with recurring bouts of a stubborn, persister-like staphylococcus infection. In the lab, the researchers found that by adding sugar to antibiotics, within two hours they could obliterate 99.9 percent of cultures of persister staphylococcus and *E. coli*, the culprit in most urinary tract infections.

“Our goal was to improve the effectiveness of existing antibiotics rather than invent new ones, which can be a long and costly process,” says Kyle Allison (ENG’11), a PhD student in Collins’ lab and the study’s first author.

The team also saw promising results after testing the antibiotic-sugar combination on *E. coli* infections in mice, where the treatment inhibited the spread of infection to the kidneys.

The most significant impact of the BU team’s research could be on tuberculosis, a chronic bacterial infection of the lungs, which kills approximately 1.7 million people worldwide each year, according to the World Health Organization. Collins and Allison plan to study whether sugar additives can improve the efficacy of TB drugs.