Researchers engineer bacterium to hunt down and kill pathogens

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A team of researchers in Singapore has developed a technique for bioengineering a bacterium to seek out and kill targeted pathogens. In their paper published in the journal *ACS Synthetic Biology*, the team describes the technique they developed, how it works in mice and the likelihood that a similar technique can be developed for use in humans.

The dream of many health care researchers is the development of universal targeted therapies that can be administered to people suffering from virtually any ailment—the perfect vaccine or drug that can kill invading bacteria while leaving healthy tissue and even other bacteria alone. This new effort by the team in Singapore suggests scientists might be catching up with fantasy—they've developed a technique for bioengineering one type of bacteria to seek out and kill another.

In their lab, the researchers programmed an *Escherichia coli* bacterium to find and kill *Pseudomonas aeruginosa*—a type of bacteria that can cause pneumonia and other ailments. They started by inserting genes into a single *E. coli* that cause the bacterium to create a peptide called microcin S—a known bacteria killer. Next they loaded up the bacterium with genes to cause the generation of a nuclease that is capable of cutting its way through the biofilms that bacteria create to stave off penetration by antibacterial agents. As part of the bioengineering, the team also caused the programmed *E. coli* to withhold its killing abilities until it made its way to the target and also gave it an ability to detect the specific target. Once found, the engineered bacterium sticks to the target, generates microcin S and kills it.

In testing their programmed bacterium in mice (by examining fecal samples before and after application), the researchers found fewer *P. aeruginosa* and unchanged numbers of healthy gut bacteria. They also report no other symptoms or side effects. Because of this, the researchers suggest their technique appears to be both safe and effective—they hope to adapt it for use in humans to help combat a wide variety of bacterial infections. In the meantime, they are working to improve the engineering process to help the bacterium better cut through biofilms.

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