Backstabbing bacteria: A new treatment for infection?

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Selfish bacterial cells that act in their own interests and do not cooperate with their infection-causing colleagues can actually reduce the severity of infection.

The selfish behaviour of these uncooperative bacteria could be exploited to treat antibiotic-resistant infections, according to research being presented at the Society for General Microbiology's autumn meeting today.

Bacteria work together by using a well-studied communication system called Quorum Sensing (QS). During infection, bacteria talk to each other using QS to coordinate the release of toxins.

Researchers at the University of Nottingham have discovered that in *Staphylococcus aureus* infections, bacteria defective in QS can benefit from 'opting out' of toxin production. By doing so, they can invest more energy in reproducing - whilst taking advantage of the nutrient-rich infection that is maintained by their neighbours.

By looking after themselves in this way, QS-deficient bacteria are quickly able to outnumber other bacteria that are busy producing toxins. As a result the overall severity of infection is reduced as fewer toxins are produced. "This opens up the interesting possibility of using these uncooperative bacteria to treat infection," said Mr Eric Pollitt who is presenting the study.

The group tested the theory by introducing *S. aureus* into waxworms that subsequently developed infections. "We found that the QS-deficient bacteria could not only outgrow normal bacteria in the same population, but that they could also invade other cooperating populations to reduce the severity of infection," explained Mr Pollitt. "This means that we could potentially isolate QS-deficient bacteria and use them to treat clinical *S. aureus* infections."

New approaches for the treatment of *S. aureus* infections are desperately needed as many strains of the bacterium, such as Meticillin-resistant *Staphylococcus aureus* (MRSA), are resistant to antibiotics. "Importantly, as any treatment involving QS-deficient bacteria would not be based on antibiotics, it could complement current treatments for *S. aureus* infections," said Mr Pollitt.

Using bacteria to treat bacterial infections is a potentially useful yet paradoxical approach. "It's an interesting concept of 'fighting like with like'," suggested Mr Pollitt. "This work also highlights that the interactions between bacteria during an infection can be just as important as the interactions between the bacteria and the host."

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