

Bacteria toxic to wound-treating maggots

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Bacteria that infect chronic wounds can be deadly to maggot 'biosurgeons' used to treat the lesions, show researchers writing in the journal *Microbiology*. The findings could lead to more effective treatment of wounds and the development of novel antibiotics.

Scientists from the Copenhagen [Wound Healing](#) Centre, Statens Serum Institut and the University of Copenhagen in Denmark showed that maggots applied to simulated wounds heavily infected with the [bacterium *Pseudomonas aeruginosa*](#), were unable to treat the wound and were left dead after 20 hours.

[Chronic wounds](#), such as [leg ulcers](#), affect 1% of the Western population and are painful and difficult to treat. Use of maggots to disinfect wounds is an ancient practice that regained popularity in the early 1990s. Maggot Debridement Therapy (MDT) is now a standard procedure at wound care centres all over the world, in which sterile larvae from the green bottle fly *Lucilia sericata* are applied to the wound either directly or contained within a sealed nylon bag. The maggots gently ingest necrotic (dead) tissue and kill ingested bacteria in the gut. In addition, the maggots secrete antimicrobial compounds into the wound, help reduce inflammation and promote wound healing. The actual biological mechanisms responsible for the process are still largely a mystery.

P. aeruginosa is an opportunistic bacterium responsible for many hospital-acquired infections. It is often associated with chronic wounds in which the bacteria clump together to form biofilms. By effectively talking to each other via a well-studied communication system called

quorum sensing (QS), bacteria in biofilms are known to be more successful at avoiding destruction by the host immune system as well as antibiotics.

Dr Anders Schou Andersen, who led the research, explained that QS was also the key to *P. aeruginosa*'s toxicity to maggots. "When we blocked the QS signalling pathways in the bacteria, the maggots were much better at surviving and potentially cleansing the wounds. Signalling between bacteria growing in biofilms is known to lead to the production of lethal toxins, without which the bacteria are more vulnerable to eradication."

Dr Andersen believes the research could benefit patients with persistent wounds. "MDT is generally very effective. It has been said that in a few cases MDT had failed, leaving the maggots dead in the lesion. We now think that this was probably due to the presence of *P. aeruginosa* in the wound," he said. "If we can find the specific bacterial mechanism that kills the maggots, we could target this when developing new treatments. For example, wounds infected with *P. aeruginosa* could be treated with an agent that interrupts bacterial signalling to ensure the success of maggot therapy and thereby wound healing."

More information: A. S. Andersen, B. Jorgensen, T. Bjarnsholt, H. Johansen, T. Karlsmark, M. Givskov and K. A. Krogh 'Quorum-sensing-regulated virulence factors in *Pseudomonas aeruginosa* are toxic to *Lucilia sericata* maggots' *Microbiology*; 156: 400 - 407.

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