

# Scientists identify new resistance genes in superbugs resistant to a common disinfectant (Update)

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Credit: Flickr/Backdoor Survival

Researchers have identified a resistance protein that allows bacteria to survive chlorhexidine, a disinfectant commonly used in wipes, cleansers and mouthwashes in hospitals.

A study led jointly by the University of Leeds and Macquarie University in Australia showed how the superbug *Acinetobacter baumannii*—prevalent among soldiers treated in medical facilities in Iraq

and Afghanistan—can pump the disinfectant out of its system.

The findings are critical for the design of new chemicals to combat the germ.

Professor Peter Henderson of the University of Leeds' School of Biomedical Sciences said: "The Australians saw that, in response to chlorhexidine, a gene becomes active and produces a protein they called *Acinetobacter Chlorhexidine Efflux*, or 'Ace' for short. Working together, we demonstrated that Ace binds to the disinfectant and effectively pumps the chlorhexidine that has leaked through the cell wall out again."

*Acinetobacter baumannii* was once treatable with normal antibiotics but is now one of the most worrying superbugs threatening the medical system. It has been particularly associated with infections of military personnel injured in Iraq and Afghanistan. Its ability to survive on disinfected artificial surfaces for long periods has allowed it to thrive and spread through the military and into the civilian medical system.

Sally Davies, the Chief Medical Officer for England, said in March that antibiotic resistance posed a "catastrophic threat" that could mean that even minor surgeries might carry deadly risks by the 2030s.

Professor Henderson said: "Identifying the resistance protein now allows us to look for a compound that will inhibit the protein's activity and form the basis of a new treatment against infection."

The early indications are that the protein specifically binds with chlorhexidine rather than other antibiotic molecules. Although some multi-

drug resistant proteins have been found, the fight against superbugs has generally been characterised by a painstaking search for several proteins associated with resistance to particular drugs and chemicals.

Members of the University of Leeds' Astbury Centre for Structural Molecular Biology are at the forefront of work on "pump" proteins.

Professor Henderson said: "There are very similar genes in other pathogenic organisms. Our next step will be to explore what these proteins do in those other organisms. In some cases, it is strongly suggested that they make the germ resistant to chlorhexidine, but in others it appears to be something else. We need to find out what that is."

He added: "The bad news is that the bugs are winning. We can't devise new antibiotics nearly fast enough to find a new way of dealing with them and there is not enough funding to pursue the research. This project is typical of the sort of work that we have to do to win the fight against superbugs."

Professor Ian Paulsen at Macquarie University said: "Antiseptics and disinfectants are a key defence used to control the spread of these bacteria in hospitals particularly. Following this discovery, we plan to investigate ways to block this pump. Such work is important in ensuring that we can continue to use successfully this disinfectant to reduce rates of infection in hospitals."

The research is published in the journal *Proceedings of the National Academy of Sciences*.

**More information:** The research has been published in the journal *Proceedings of the National Academy of Sciences* this week.

[www.pnas.org/content/early/2013 ... /1317052110.abstract](http://www.pnas.org/content/early/2013/11/27/1317052110.abstract)

Provided by Macquarie University

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