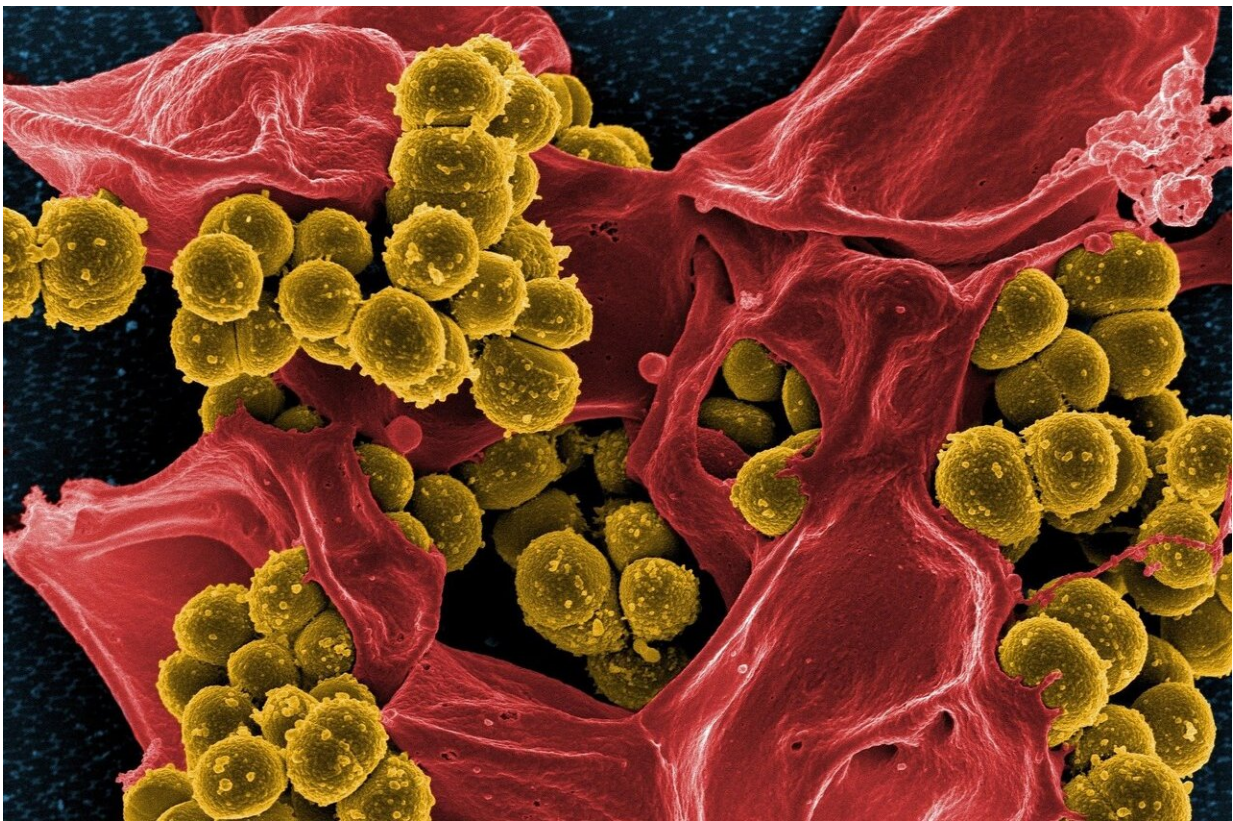


First proof a synthesized antibiotic is capable of treating superbugs

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A "game changing" new antibiotic which is capable of killing superbugs has been successfully synthesised and used to treat an infection for the first time—and could lead to the first new class of antibiotic drug in 30

years.

The breakthrough is another major step forward on the journey to develop a commercially viable drug [version](#) based on [teixobactin](#)—a natural antibiotic discovered by US scientists in soil samples in 2015 which has been heralded as a "gamechanger" in the battle against antibiotic resistant pathogens such as *MRSA* and *VRE*.

Scientists from the University of Lincoln, UK, have now successfully created a simplified, synthesised form of teixobactin which has been used to treat a bacterial [infection](#) in mice, demonstrating the first proof that such simplified versions of its real form could be used to treat real bacterial infection as the basis of a new drug.

The team at Lincoln developed a library of synthetic versions of teixobactin by replacing key amino acids at specific points in the antibiotic's structure to make it easier to recreate. After these simplified synthetic versions were shown to be highly potent against superbug-causing bacteria in vitro - or test tube—experiments, researchers from the Singapore Eye Research Institute (SERI) then used one of the synthetic versions to successfully treat a [bacterial infection](#) in mice.

As well as clearing the infection, the synthesised teixobactin also minimised the infection's severity, which was not the case for the clinically-used antibiotic, moxifloxacin, used as a control study. The findings are published in the *Journal of Medicinal Chemistry*.

It has been predicted that by 2050 an additional 10 million people will succumb to [drug resistant infections](#) each year. The development of [new antibiotics](#) which can be used as a last resort when other drugs are ineffective is therefore a crucial area of study for healthcare researchers around the world.

Dr Ishwar Singh, a specialist in novel drug design and development from the University of Lincoln's School of Pharmacy, said: "Translating our success with these simplified synthetic versions from test tubes to real cases is a quantum jump in the development of new [antibiotics](#), and brings us closer to realising the therapeutic potential of simplified teixobactins.

"When teixobactin was discovered it was groundbreaking in itself as a new antibiotic which kills bacteria without detectable resistance including superbugs such as *MRSA*, but natural teixobactin was not created for human use.

"A significant amount of work remains in the development of teixobactin as a therapeutic antibiotic for human use—we are probably around six to ten years off a drug that doctors can prescribe to patients—but this is a real step in the right direction and now opens the door for improving our in vivo analogues."

Dr Lakshminarayanan Rajamani from SERI added: "We need sophisticated armour to combat antibiotic-resistant pathogens. Drugs that target the fundamental mechanism of bacterial survival, and also reduce the host's inflammatory responses are the need of the hour. Our preliminary studies suggest that the modified peptide decreases the bacterial burden as well as disease severity, thus potentially enhancing the therapeutic utility."

The work builds on the success of the Lincoln team's pioneering research to tackle antimicrobial resistance over the past 22 months to turn teixobactin into a viable drug. The team will now develop a bigger library of simplified synthetic versions which can be used in a diverse number of applications, advancing the goal of a clinical [drug](#).

More information: Anish Parmar et al, Design and Syntheses of

Highly Potent Teixobactin Analogues against *Staphylococcus aureus*, Methicillin-Resistant *Staphylococcus aureus* (MRSA), and Vancomycin-Resistant Enterococci (VRE) in Vitro and in Vivo, *Journal of Medicinal Chemistry* (2018). DOI: [10.1021/acs.jmedchem.7b01634](https://doi.org/10.1021/acs.jmedchem.7b01634)

Provided by University of Lincoln

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