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HKUST researchers identify the cause behind bacterial resistance

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Researchers at The Hong Kong University of Science and Technology (HKUST) have identified for the first time the culprit behind the cause of broad spectrum bacterial resistance to peptide antibiotics widely perceived as the last-line of defense against antibiotic-resistant bacteria, opening a new direction to the design of new drugs in tackling superbugs.

The discovery made by Chair Professor from the Division of Life Science Prof Qian Pei-Yuan and his fellow researchers, came in the best moment as the team has also discovered that this enzyme, which they identified as the cause of broad-spectrum bacteria resistance against peptide antibiotics, was actually found in not just a few, but many different strains of bacteria, sounding an alarm against persistent improper use of antibiotics.

Peptide antibiotics – including vancomycin and polymyxin for respective treatment of Staphylococcus Aureus (CA-MRSA) infection and *Escherichia coli* infection, are often used as the last resort due to their resilience to multidrug resistant bacteria. However, a few years ago scientists have started identifying a few types of peptide antibiotics which have developed symptoms of bacterial resistance, although the causes behind remained unknown. Now, following the analysis of over 6,000 bacteria genomes under repeated validation through gene editing, chemical and enzymatic analyses, Prof Qian's team eventually identified a family of D-stereospecific resistance peptidases (DRPs) as the source of the problem, and its magnitude extends well beyond a few strains of bacteria.

'Misuse and overuse of antibiotics of humans will intensify the problem of antibiotic resistance of pathogens, that makes research on peptide antibiotics even more important," he added. "Deepening our understanding of antibiotic resistance mechanisms to peptide antibiotics does not only serve as a wake-up call, but is also conducive to increasing our collective antibiotic arsenal. The findings of DRPs is just the beginning, we hope it will lead to more research on the use and development of peptide antibiotics."

The findings were recently published in the scientific journal Nature Chemical Biology.