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ASIA EDITION

Singapore develops novel therapy for treating vancomycin-resistant bacterial infections

08 March 2023 | News

By 2050, the Asia-Pacific region is forecasted to account for 47% of AMR-related deaths worldwide if immediate and coordinated actions are not taken to avert a potential drug-resistance crisis

Researchers from the Antimicrobial Resistance (AMR) Interdisciplinary Research Group (IRG) at Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, in collaboration with Singapore Centre for Environmental Life Sciences Engineering (SCELSE), Nanyang Technological University (NTU), Massachusetts Institute of Technology (MIT), and University of Geneva, have developed a novel combination therapy using an anticancer agent, mitoxantrone (MTX), together with an antibiotic, vancomycin, for treating bacteria that are resistant to the vancomycin, which is also known as vancomycin-resistant *Enterococcus faecalis* (VRE).

The therapy uniquely targets both VRE and the host, stimulating the host immune system to more effectively clear bacterial infections and accelerate infected wound healing.

Antimicrobial resistance (AMR) is a significant global health concern, causing 4.95 million deaths from infections associated with or attributed to antimicrobial resistance in 2019 alone.

VRE is a 'hard-to-kill' bacteria due to its increasing antibiotic resistance and can cause serious infections, including urinary tract, bloodstream, and wound infections associated with catheters or surgical procedures.

In this research, the team tested MTX's effectiveness and antibiotic activity against VRE, both *in vitro* and *in vivo*. Despite VRE's resistance to vancomycin, MTX was found to inhibit the growth of VRE more effectively when used in the presence of vancomycin. This outcome is due to the synergistic relationship between MTX and vancomycin, which makes VRE more sensitive to vancomycin by lowering the vancomycin concentration required to kill VRE.

"Our team's breakthrough in the discovery of mitoxantrone as a highly effective dual bacterium- and host-targeted therapy against VRE, represents a major step forward in the fight against VRE infections," said Dr Ronni da Silva, first author of the paper and Postdoctoral Researcher at SMART AMR.