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Treating methicillin-resistant *Staphylococcus aureus* (MRSA) with synergistic drug combinations

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Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major cause of infections in hospital and resistant to all known beta-lactam antibiotics. The limited antibiotics available to treat MRSA, such as vancomycin, daptomycin and linezolid, have side effects. Hence, there is an imminent need for new antibiotics to treat drug-resistant infections. Unfortunately, the development of new antibiotics faces many challenges. The fact remains that only two new classes of antibiotics have been developed over the past two decades; thus, alternative approaches to controlling bacterial infections are urgently required. One such approach is to re-sensitise these multidrug-resistant (MDR) bacteria to antibiotics using approved non-antibiotic compounds. Non-steroidal anti-inflammatory drugs (NSAIDs) are widely used to treat inflammation, pain and fever that are associated with bacterial infections. These non-antibiotic drugs may act through mechanisms that are different from those of existing antibiotics, thus enhancing antibiotic activity or reversing antibiotic resistance. In view of this, we assessed the antibacterial activity of commonly used NSAIDs (aspirin, ibuprofen, diclofenac and mefenamic acid) against several strains of pathogenic bacteria as well as their combinational effect with antibiotics (chloramphenicol and cefuroxime) on the growth of MRSA. The interaction between ibuprofen/aspirin with cefuroxime was demonstrated to be synergistic against MRSA reference strain, whereas for MRSA clinical strains additive effects were observed for both NSAIDs and cefuroxime combinations. The combination of chloramphenicol with ibuprofen/aspirin was synergistic against all the tested MRSA strains. Although individually less potent than common antibiotics, these NSAIDs are synergistic in action with cefuroxime and chloramphenicol. Overall, this combinational therapy of pairing an antibiotic with a NSAID as an adjuvant molecule presents a potential therapeutic option to treat infections and inflammatory conditions, and could potentially be used in combating multidrug-resistant MRSA.

Biography

Elaine CWL has completed her PhD from Monash University, Malaysia Campus, focusing on identifying new antibiotics from plants to target MRSA. She is currently a Lecturer by research at Center of Bioactive Compounds and Drug Delivery, International Medical University, Malaysia. Her research interests include discovery of bioactive lead structures from natural sources as well as investigating the synergistic effect and mode of action of these compounds, particularly in finding treatments for microbial infections caused by antibiotic-resistant microorganism. She is the Grant Holder and Principal Investigator of several research projects, with funding from the Ministry of Education, Malaysia.

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