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Novel approaches to combat antibiotic resistance in microbes

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There is no doubt that the discovery of the antibiotic, penicillin and the subsequent antimicrobial drugs has revolutionised the field of medicine in treating microbial infections. However, this blessing could not withstand the modern era for long as a new threat has emerged over the years that challenges the well-being of humans and animals alike, including environmental health. This threat is known as antibiotic resistance. Some microbes have evolved through mutation, selection and genetic transfer mechanisms to be resistant to several antibiotic categories, thus leading to the formation of multidrug-resistant (MDR) strains. According to the many reports and surveys conducted by the World Health Organisation (WHO), the dissemination of antibiotic resistance is seriously affecting many countries, particularly low-income countries. One of the main reasons behind this issue is the indiscriminate misuse of antibiotics. Considering the level of threat that this issue poses in treating microbial infections, it is unfortunate that not much progress has been made to combat this global problem. However, scientists are always trying to study and establish novel approaches to fight antibiotic resistance and establish effective alternatives to pre-existing antibiotics.
Many recent studies are now focusing on the potential use of active antimicrobial peptides (AMPs) as peptide-based antibiotic alternatives. AMPs derived from animal sources like frogs are being engineered to achieve a high therapeutic index with enhanced bioavailability. Many of these AMPs have been used to target specific regions of the bacterial cell and some of them are currently being used for clinical trials. Another approach that is currently being revisited to be a potential alternative to antibiotics is the use of phage therapy, which involves using bacteriophages as natural antimicrobial agents. This could be particularly useful for agriculture, food industry and veterinary applications. Other studies suggest targeting gene sequences using certain oligomers that are designed to inhibit the expression of specific bacterial genes to increase the sensitivity to antibiotics. While it is necessary that awareness is raised to prevent the misuse and extensive abuse of antibiotics, it is equally important to come up with novel strategies to solve the glaring issue of antibiotic resistance. As such, these types of studies will be essential to develop next-generation antibiotics and enhanced alternatives to conventional antibiotic treatment.

Keywords: Microbes, Antibiotics, Antibiotic resistance, Multidrug resistance, Public health

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