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Short Communcation

Multi Drug-Resistant Bacteria against Antibacterial Drugs

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DESCRIPTION

Antibiotics are used to treat or prevent a variety of bacterial infections. Vancomycin and teicoplanin are examples of Glycopeptide Antibiotics (GPAs), which are essential antibiotics often used to treat multidrug-resistant gram-positive pathogenic bacteria. Despite the success of second-generation GPAs, which were created by chemically altering natural GPAs, the advent of GPA resistance has highlighted the need to create new members of this compound class [1]. GPA research has made significant strides recently, including learning more about their biosynthesis, enhancing titre in production strains, creating new derivatives through unique chemical alterations, and discovering a new mechanism of action for structurally different type-V GPAs. When considered collectively, these developments show a substantial untapped potential for the continued development of GPAs to combat the multidrug-resistant bacterium problem [2].

Antimicrobial Resistant (AMR) microorganisms are surfacing and proliferating on a worldwide scale, endangering our ability to treat microbial infections. Therefore, there is an immediate need for the creation of new antibiotic groups with unique modes of action that can destroy or prevent the development of such AMR bacteria. Here, various bacterial species and drug-resistant strains are tested against a new class of indole-containing arene ruthenium organometallic compounds. The most active compound, [(p-cym)Ru(O-cyclohexyl-1H-indole-2-carbothioate)Cl] (3), exhibits growth inhibition and bactericidal action against a variety of microorganisms, including *Acinetobacter baumannii*, *Mycobacterium abscessus*, *Mycobacterium tuberculosis*, *Staphylococcus aureus*, *Salmonella enterica serovar*. The low toxicity of this chemical series toward human cells is significant [3]. Because of the antibiotic family's originality, mild cytotoxicity, and inhibitory action against gram positive, gram negative, and acid-fast bacteria, this series has great potential for further development.

Individuals colonised with antibiotic-resistant bacteria are at risk of illness, and the timing of spontaneous decolonization varies greatly across patients [4]. As a consequence, managing these patients takes time and requires patient seclusion and cohort protocols. Faecal Microbiota Transplantation (FMT) has been utilized to shorten this gut colonization.

Combining AMPs with traditional antibiotics has gained popularity because it frequently results in a synergistic antibacterial action. In the presence of blood, researchers discovered that Pt5-1c, an AMP generated from phosvitin, has antibacterial action against MDR bacteria (*S. aureus* USA500, *E. coli* 577, and *K. pneumoniae* 2182). On this basis, they revealed that Pt5-1c acted synergistically with standard antibiotics (oxacillin, vancomycin, streptomycin, and azithromycin) against three MDR bacteria developing as biofilms *in vitro* and *in vivo* [5]. Furthermore, Pt5-1c restored *S. aureus* USA500 sensitivity to oxacillin and vancomycin, *E. coli* 577 sensitivity to streptomycin, and *K. pneumoniae* 2182 sensitivity to azithromycin. Importantly, long-term Pt5-1c exposure did not result in antimicrobial resistance. Such findings not only point to a promising combinatorial therapy strategy for antibiotic-tolerant infections, but also to the possibility of Pt5-1c being used to extend the use of antibiotics like oxacillin, vancomycin, streptomycin, and azithromycin, which are at risk of becoming ineffective due to antimicrobial resistance.

CONCLUSION

Several CRE outbreaks have cost hospitals and healthcare organizations millions of dollars in cleaning and containment costs. For the treatment of CR- and XDR-GNB, parenteral polymyxin B/E has a poor pharmacokinetic profile. With a minimum inhibitory concentration of 0.5 mg/L, tigecycline has been proven to be acceptable for the treating of bloodstream infections caused by GNB. Ceftazidime-avibactam is an antibiotic used as a last option against GNB of Ambler class A/C/D enzyme-producers and the vast majority of CR-P. *aeruginosa* isolates. Ceftolozane-tazobactam has also been reported to have excellent *in vitro* experiments towards CR- and XDR-P. *aeruginosa* isolates. Several pharmaceutical companies have committed to researching new antibiotics to tackle these dangerous XDR-GNBs. Despite this, only a few antibiotics have been demonstrated to be efficacious in vitro against CR/XDR-A.

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baumannii complex isolates. In this period of antibiotic pipelines, rigorous antibiotic stewardship is just as critical including in isolation cohorts in controlling the growth of CR/XDR-GNB and easing resistance trends.

REFERENCES

1. Hansen MH, Stegmann E, Cryle MJ. Beyond vancomycin: recent advances in the modification, reengineering, production and discovery of improved glycopeptide antibiotics to tackle multidrug-resistant bacteria. Curr Opin Biotechnol. 2022;77:102767.
2. Nolan VC, Rafols L, Harrison J, Soldevila-Barreda JJ, Crosatti M, Garton NJ, et al. Indole-containing arene-ruthenium complexes with broad spectrum activity against antibiotic-resistant bacteria. CRMICR. 2022;3:100099.
3. Duan H, Zhang X, Li Z, Yuan J, Shen F, Zhang S. Synergistic effect and antibiofilm activity of an antimicrobial peptide with traditional antibiotics against multi-drug resistant bacteria. Microb Pathog. 2021;158:105056.
4. Jean SS, Harnod D, Hsueh PR. Global Threat of Carbapenem-Resistant Gram-Negative Bacteria. Front Cell Infect Microbiol. 2022:236.
5. Amrane S, Lagier JC. Fecal microbiota transplantation for antibiotic resistant bacteria decolonization. Hum Microbiome J. 2020;16:100071.