Antimicrobial resistance

Since the 1990s, antimicrobial resistance (AMR) has escalated dramatically among Acinetobacter baumannii-calcoaceticus complex [ABC]). Global spread of multidrug-resistant (MDR)-ABC strains reflects dissemination of a few clones between hospitals, geographic regions, and continents; excessive antibiotic use amplifies this spread. Many isolates are resistant to all antimicrobials except colistimethate sodium and tetracyclines (minocycline or tigecycline); some infections are untreatable with existing antimicrobial agents. AMR poses a serious threat to effectively treat or prevent ABC infections. Strategies to curtail environmental colonization with MDR-ABC require aggressive infection-control efforts and cohorting of infected patients. Thoughtful antibiotic strategies are essential to limit the spread of MDR-ABC. Optimal therapy will likely require combination antimicrobial therapy with existing antibiotics as well as development of novel antibiotic classes [1)].

Pyrinezolid (PZ), a novel oxazolidinone compound, can effectively inhibit most Gram-positive bacteria, including methicillin resistant Staphylococcus aureus (MRSA) and vancomycin-resistant Enterococci (VRE). Though PZ is a promising antimicrobial candidate, the druggability of PZ is limited by its poor water solubility. Therefore, the amphipathic mPEG-PLLA copolymer was used to prepare the pyrinezolid micelles (PZ-M). Herein, we described the preparation, pharmacokinetic properties, tissue distribution, efficacy and toxicity of PZ-M. In vivo studies show that PZ-M possess prolonged blood circulation time and increased oral bioavailability compared with free PZ. Meanwhile, PZ-M increase lung PZ exposure and reduce liver and kidney exposure, which indicates that PZ-M may enhance the efficacy in vivo in MRSA-related pneumonia patients and decrease potential renal and hepatic toxicities [2)].

Klebsiella pneumoniae has been reported to develop increased antimicrobial resistance. Ceftazidime-avibactam (CZA) is a novel antibiotic with activity against serine-lactamase. Chen et al. investigated the sensitivity of carbapenem-resistant K. pneumoniae (CRKP) to CZA and the mechanisms of drug resistance in our hospital.

Methods and results: Patient characteristics were obtained from medical records. Klebsiella pneumoniae and its antibiotic susceptibility were determined using the Vitek-2 Compact instrument. The antimicrobial resistance genes KPC, NDM, OXA-48, VIM, IMP, CIM, SPM, TMB, SMB, SIM, AIM, and DIM were detected using Real-Time PCR. Multilocus sequence typing was used for genetic RELATEDNESS analysis. In total, 121 CRKP strains were isolated from patients in the intensive care unit (51.2%), senior ward (12.4%), and neurosurgery department (10%). With an average age of 72.5 years, most patients were in care for respiratory (34.7%), brain (20.7%), digestive tract (13.2%), and cardiovascular (8.3%) diseases. Specimens were predominantly obtained from sputum (39.67%), urine (29.75%) and blood (6.61%).

Conclusion: Of 23 CZA-resistant CRKP strains (19.01%), ST11 being the most common at 56.52%, eleven NDM-1-positive (47.83%) and four NDM-5-positive (17.39%) strains were detected.

Significance and impact of study: Our study indicates that CZA resistance occurs in ~19.01% CRKP strains and that blaNDM-1 and blaNDM-5 might be critical for resistance [3)].

1)

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2)
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