Mechanism of Ciprofloxacin- and Imipenem- Resistance in Multidrug-Resistant Acinetobacter baumannii

曾麗芸、劉淑瑛 ; 邱政洵

E-mail: 9417462@mail.dyu.edu.tw

ABSTRACT

The infections caused by multidrug-resistant Acinetobacter baumannii (MDRAB) have been increasing in recent years, ever since MDRAB became major sources for nosocomial infections in many countries. In this study, 35 strains of A. baumannii isolated from Chang-Gung Memorial Hospital (CGMH） were tested. We analyzed the expression of ade in these clinical isolates ’ efflux pump systems by real-time quantitative PCR, and found that the expression of this drug transporter were most significantly associated with drug-resistance to ciprofloxacin and ampicillin-sulbactam. Among these isolates, ciprofloxacin-resistant AB-1227 constitutively expressed ade in the presence or absence of ciprofloxacin, but the mechanism remained to be elucidated. Furthermore, mutation analyses of GyrA and ParC showed that the change of few residues, together with ciprofloxacin-output by Ade transporter, highly increased the capacity of resistance to ciprofloxacin. In the studies of imipenem-resistance genes, we found blaIMP-1 in 8 of 35 isolates. Besides blaIMP-1, the combination of drug-resistance genes located in the gene cassette including 5''CS-blaIMP-1-aadA4-3''CS, 5''CS-aacA4-aadA1-3''CS, and 5''CS- aacC1- aadA1-3''CS. No blaVIM-1 or blaVIM-2 was found in these resistant isolates. It had been shown that blaIMP-1 can be inserted into the plasmids, so the drug-resistance among pathogens could spread through plasmids transfer. In conclusion, the multidrug-resistance of A. baumannii was not due to drug resistance genes only, but also some other drug-resistance mechanisms (ex. efflux pump). All together, these mechanisms make pathogens more drug-resistant.

Keywords : multidrug-resistant Acinetobacter baumannii (MDRAB)，real-time quantitative PCR，efflux pump，drug resistance gene，ciproflo

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