Cefiderocol – a challenge for disc diffusion antimicrobial susceptibility testing

- evaluation of *Klebsiella pneumoniae* susceptibility -

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INTRODUCTION

Cefiderocol is a new cephalosporin–siderophore conjugate antibiotic highly effective against infections caused by extensively-drug-resistant Gram-negative bacilli.
Antimicrobial susceptibility testing of cefiderocol is challenging due to its unique mechanism of action which puts the microdilution as the most and only reliable method. Easier and cheaper test accepted by EUCATS for cefiderocol antimicrobial susceptibility is disc diffusion. But the quality control results of this method provide evidence that there is still an area of technical uncertainty.

PURPOSE

This study aimed to test whether the type of medium on which the tested strain was initially cultured affects the cefiderocol susceptibility disc diffusion testing..

MATERIAL & METHODS

We analyzed the antibiotic susceptibility of 50 *Klebsiella pneumoniae* MBL strains obtained from various samples at the Medical Microbiological Laboratory of the Central Teaching Hospital of the Medical University of Lodz. Isolates were previously cultured on 3 different kinds of microbiological media, routinely used in clinical microbiology laboratories: Blood Agar, MacConkey Agar, Chromogenic Agar; acquired from 3 different manufacturers - Thermo Scinetific (USA), Becton Dickinson (USA), Graso (Poland). Cefiderocol minimal inhibitory concentration (MIC) for all tested strains was determined using microdilution.

For all strains:
1. the MICs were determined by the method of commercial antibiotic gradient strips for cefiderocol and by the broth microdilution method for cefiderocol.
2. the growth inhibition zones were determined by the disc diffusion method – with 30 µg cefiderocol commercial discs.

Interpretation fo the susceptibility to cefiderocol was based on the current EUCAST standard. Statistical analysis was performed with the Statistica 13 software.

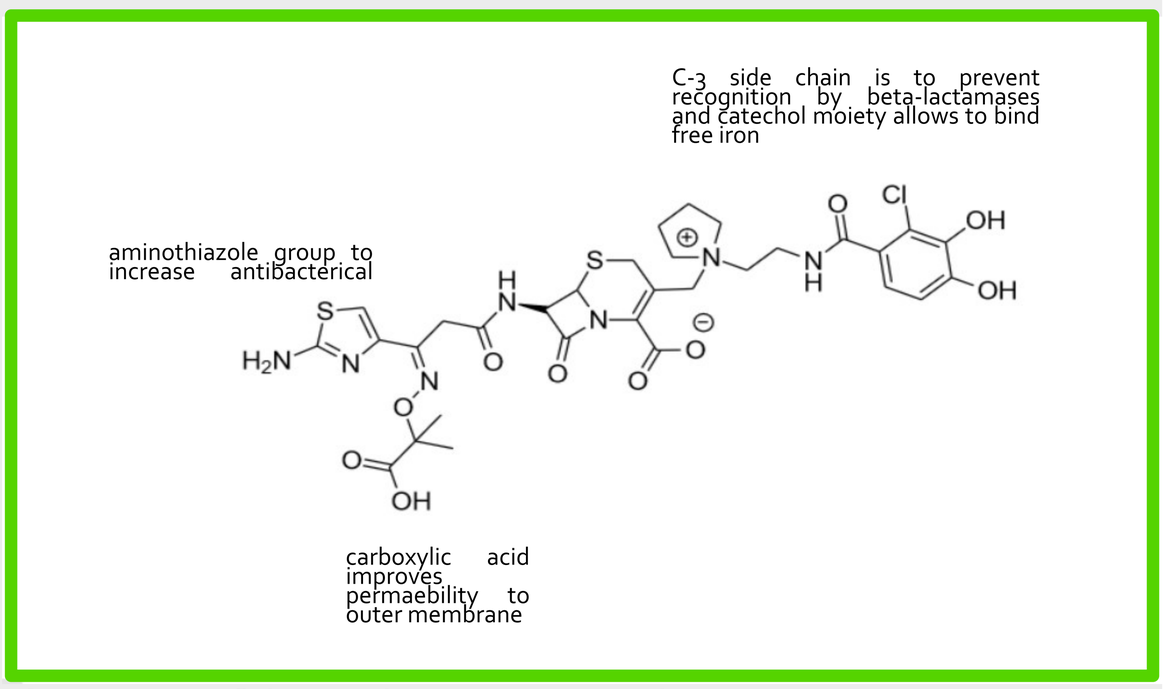

Figure 1. Cefiderocol structures with its moieties.

RESULTS

All growth inhibition zones had a statistically significant negative correlation with MIC values. No significant differences were observed between the inhibition zones on Blood and MacConkey Agar from different manufacturers, and no significant differences were observed when comparing Blood Agar vs. MacConkey Agar. Comparing Chromogenic Agar from different manufacturers, and in comparison to other media, significant differences were observed.

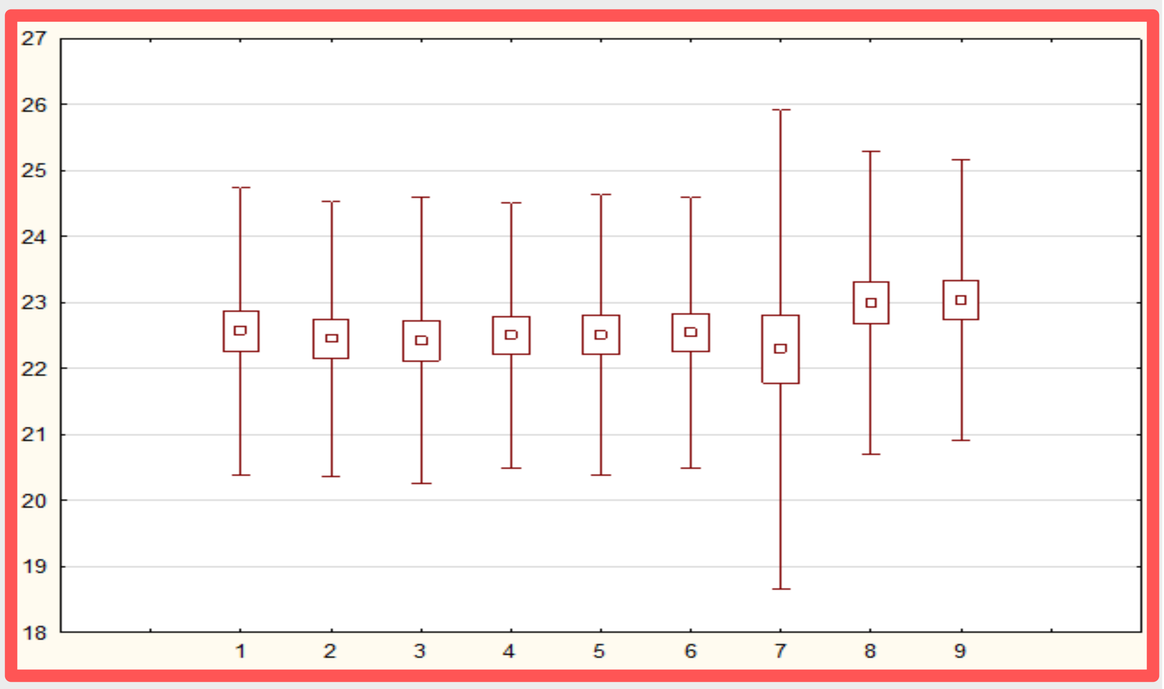

Figure 2. Cefiderocol mean growth inhibition zones [mm] using colonies from diffrent media from different manufacturers. Legend: 1 - blood agar, Thermo; 2 - blood agar, BD; 3 - blood agar, Graso; 4 - MacConkey agar, Thermo; 5 - MacConkey agar, BD; 6 - MacConkey agar, Graso; 7 - chromogenic agar, Thermo; 8 - chromogenic agar, BD; 9 - chromogenic agar, Graso. The boxes show standard error and the whiskers shows standard deviation

CONCLUSIONS

1) Blood and MacConkey Agar results should be carefully examined – colonies grown on these media can be used in cefiderocol susceptibility testing.
2) Chromogenic Agar should not be used for susceptibility testing.

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