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ANTIMICROBIAL ACTIVITY OF DAPTOMYCIN IN COMPARISON TO GLYCOPEPTIDES AND OTHER ANTIMICROBIALS WHEN TESTED AGAINST NUMEROUS SPECIES OF COAGULASE-NEGATIVE STAPHYLOCOCCUS (CoNS)

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INTRODUCTION

Coagulase-negative staphylococci (CoNS) have long been regarded as culture contaminants but their important role as true pathogens, and their increasing incidence, have been recognized in recent years. CoNS are by far the most common cause of bacteremia related to indwelling devices and most of these infections are hospital-acquired. Other important infections caused by CoNS include central nervous system (CNS) infections, native or prosthetic valve endocarditis, urinary tract infections, and endophthalmitis.

CoNS infections are characterized by their incidence and usually require the removal of the catheter or device. Resistance to multiple antimicrobial agents further complicates treatment of systemic infections. Resistance to ceftriaxone and other β-lactams is widespread among CoNS associated with human infections. Although CoNS are usually susceptible to glycopeptides, increased MIC values for teicoplanin (≥8 μg/ml) and vancomycin (≥4 μg/ml) are frequently reported and may be related to poor clinical outcomes.

Daptomycin is a cyclic lipopeptide antimicrobial with a novel mode of action against Gram-positive organisms. Daptomycin is rapidly bactericidal and has shown excellent in vitro activity against the most commonly isolated CoNS organisms. We evaluated the activity of daptomycin in comparison to vancomycin and teicoplanin at a large collection of clinical CoNS isolates.

MATERIALS AND METHODS

Bacterial isolates.

A total of 22,024 clinically-isolated species of CoNS (24 species) were collected from 203 hospitals in 42 countries as part of the SENTRY Antimicrobial Surveillance Program over a 5-year period (2002-2010). The isolates were collected from medical centers located in Europe (37.6%), North America (37.5%), Latin America (15.5%) and Asia-Pacific region (8%). The majority of strains (>95%) were from bloodstream infections. Species identification was performed at the local laboratory and confirmed at JMI Laboratories, when necessary, using algorithms and the automated Vitek systems (Vitek and Vitek 2; bioMérieux, Hazelwood, Missouri, USA).

Antimicrobial susceptibility testing.

All isolates were tested for susceptibility by reference broth microdilution methods using the Clinical Laboratory Standards Institute recommendations (CLSI, M2-A7, 2008). Susceptibility testing was performed using validated broth microdilution panels manufactured by TREK Diagnostics Systems/Cleveland (Ohio, USA). Confirmation of MIC values was performed according to CLSI (M100-S21, 2011) and validation of MIC values was performed by concurrent testing of CLSI-recommended (M100-S21, 2011) quality control (QC) strains derived from available ATCC-27037 and Enterococcus faecalis ATCC 29212.

RESULTS

Table 1. Antimicrobial activity of daptomycin and comparator tested against 22,024 clinical isolates of coagulase-negative staphylococci.

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>MIC (μg/ml)</th>
<th>% Susceptible</th>
<th>% Intermediate</th>
<th>% Resistant</th>
<th>species/no. tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daptomycin</td>
<td>0.25</td>
<td>99.3</td>
<td>0.5</td>
<td>0.2</td>
<td>22,024</td>
</tr>
<tr>
<td>Tigecycline</td>
<td>0.06-4</td>
<td>99.3</td>
<td>0.2</td>
<td>0.5</td>
<td>22,024</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>≥2</td>
<td>99.1</td>
<td>0.2</td>
<td>0.7</td>
<td>22,024</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>≥2</td>
<td>99.1</td>
<td>0.2</td>
<td>0.7</td>
<td>22,024</td>
</tr>
</tbody>
</table>

Overall, daptomycin (MIC50/90, 0.25/0.5 μg/ml) inhibited 99.8% of CoNS at the susceptible breakpoint of ≤1 μg/ml was four- to 16-fold more active than vancomycin (MIC50/90, 1/2 μg/ml) and was four- to 16-fold more active than teicoplanin (MIC50/90, ≤2/8 μg/ml) and was four- to 16-fold more active than tigecycline (MIC50/90, ≤0.12/0.25 μg/ml).

CONCLUSIONS

Daptomycin exhibited excellent in vitro activity against a large collection (22,024) of CoNS clinical isolates, with 99.9% of strains being susceptible.

SELECTED REFERENCES


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