Mecillinam has potent in vitro activity against
Chlamydia pneumoniae ATCC VR1310

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Sir, Chlamydia pneumoniae (previously known as Chlamydia pneu-
moniae) was first characterized in 1986 and is now recognized as
an important respiratory pathogen.1 The organism can cause pneu-
monia, bronchitis, sinusitis and pharyngitis as well as community-
acquired pneumonia.1 The organism can cause pneumonia, bronchitis, sinusitis and pharyngitis as well as community-acquired pneumonia.1 C. pneumoniae is susceptible in vitro to a number of antibiotics including macrolides, tetracyclines, quino-
lones and penicillins.2,3 Although chlamydiae lack detectable quanti-
ties of peptidoglycan, the susceptibility of C. pneumoniae to penicillins is consistent with the presence of penicillin-binding proteins (PBPs) in this organism.4

In a recent study with Chlamydia trachomatis, we observed that mecillinam, a semi-synthetic penicillin, possessed potent in vitro anti-chlamydial activity that was superior to other penicillins, cepha-
losporins and carbapenems.5 Since the susceptibility of C. pneu-
moniae to β-lactam antibiotics has not been extensively studied we
decided to examine the activity of a number of these antibiotics,
including mecillinam, against a recognized strain of C. pneumoniae. One strain was tested as there are only a few reference isolates and unlike C. trachomatis, there are no biovars or serovars of C. pneu-
moniae.

C. pneumoniae strain ATCC VR1310 was cultured in HEp2 cells and antibiotic MICs and MBCs determined essentially as described previously.5 We observed that benzylpenicillin, ampicillin and mecillinam were the most active β-lactam antibiotics with MICs in the range 0.2–2.0 mg/L and MBCs in the range 0.2–8.0 mg/L (Table 1). Among these penicillins, mecillinam was the most potent, exhibiting an MIC/MBC of 0.2 mg/L. In contrast, ceftriaxone and imipenem only exhibited moderate activity and cefotaxime and meropenem were essentially inactive. These results with C. pneumoniae are qualitatively similar to those we previously reported for C. trachomatis.6 Consequently, we have now demonstrated that mecillinam has potent in vitro activity against both species.

In C. trachomatis, the superior anti-chlamydial activity of mecillinam appears to result from selective binding to PBP-1, the largest of the three PBPs present in this organism.3 Genomic analysis of C. pneumoniae implies the presence of three PBPs in this organism, which appear to be homologues of the C. trachomatis PBPs. However, using radiolabelling techniques that have been successful for direct detection of PBPs in C. trachomatis,7 we were unable to visualize these proteins in membrane preparations from C. pneumoniae ATCC VR1310. Therefore, unfortunately, we have been unable to examine binding affinities of mecillinam and other β-lactam antibiotics for the PBPs of C. pneumoniae.

β-Lactam antibiotics are usually considered to lack sufficient activity against C. pneumoniae to have a role in the therapy of infec-
tions caused by this organism, but patients with diagnosed C. pneu-
moniae infections have responded well to therapy with ceftriaxone and/or cefuroxime axetil.8 Whether mecillinam might have a role in the treatment of C. pneumoniae is unknown. Nevertheless, the potent bactericidal activity of this antibiotic suggests that it could be an interesting agent for further study.

Table 1. Activities of selected penicillins, cephalosporins and carbapenems against C. pneumoniae ATCC VR1310

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>MIC (mg/L)</th>
<th>MBC (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzylpenicillin</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>2.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Mecillinam</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>256</td>
<td>512</td>
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<tr>
<td>Imipenem</td>
<td>512</td>
<td>512</td>
</tr>
<tr>
<td>Meropenem</td>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>

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References

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