nem/cilastatin or other third-generation cephalosporins (14, 15) and requires special attention in future clinical studies. No patient exhibited signs of neurotoxicity or nephrotoxicity.

From the results of this study it is evident that meropenem was as effective as imipenem/cilastatin in the therapy of intraabdominal infections of moderate severity requiring surgery. The fact that meropenem lacks neurotoxicity, at least in animal experiments (5), and does not require the presence of a dehydropeptidase I inhibitor, renders the newer carbapenem an attractive candidate over imipenem/cilastatin for the treatment of severe or nosocomial infections requiring surgery, particularly when bacteria with multiple resistance to commonly used antibiotics are implicated. Larger studies in seriously ill patients are needed to establish the full clinical potential of meropenem.

References


Adherence of Corynebacterium urealyticum (CDC Group D2) and Corynebacterium jeikeium to Intravascular and Urinary Catheters

F. Soriano*, C. Ponte, M.J. Galiano

The ability of Corynebacterium urealyticum, Corynebacterium jeikeium and other control strains to adhere to two intravascular catheters (polyvinyl chloride and Teflon) and one urinary catheter (Teflon-coated rubber) was studied. Results demonstrated that the Corynebacterium species adhered to all catheter materials in greater numbers than a control strain of Micrococcus luteus (p < 0.001). There was not a clear difference in the ability of the strains of Corynebacterium jeikeium and Corynebacterium urealyticum to adhere to the catheters tested, so that differences other than this property could explain their different pathogenicity for humans.

Intravascular and intravesical catheter-associated infections are important causes of nosocomial infections other than this property could explain their different pathogenicity for humans.

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morbidity and mortality (1, 2). Bacterial adherence to foreign body materials seems to be a critical factor in the initiation of infections where adhesion precedes bacterial colonization with subsequent infection (3, 4).

*Corynebacterium urealyticum*, formerly known as coryneform CDC group D2 (5, 6), is frequently involved in urinary tract infections, mainly in patients with urological disorders who are or have been catheterized (7). *Corynebacterium jeikeium*, on the other hand, causes catheter-associated septicemia and other infections related to the presence of foreign bodies (8).

The aim of this investigation was to examine the adhesivity of the above-mentioned *Corynebacterium* species to intravascular and urinary catheter materials.

**Materials and Methods.** Bacteria used for the study included one strain each of the standard American Type Culture Collection (ATCC) strains *Corynebacterium urealyticum* ATCC 43044, *Corynebacterium xerosis* ATCC 373 and *Micrococcus luteus* ATCC 9431 as well as the following five fresh clinical isolates: *Corynebacterium urealyticum* FJD 70, *Corynebacterium jeikeium* FJD 89 and FJD 104, *Corynebacterium pseudodiphtheriticum* FJD 1 and *Staphylococcus epidermidis* FJD 5. All clinical isolates were identified by standard microbiological techniques (9, 10).

Each bacterial strain was cultured for 20 h in tryptic soy broth (TSB) with 1% Tween 80 (Difco Laboratories, USA) at 37 °C, harvested by centrifugation (1,500 x g for 10 min) and washed twice in phosphate buffered saline (PBS) (FA buffer, Difco) at pH 7.2. The organisms were resuspended in PBS at concentrations of approximately 5 x 10^5 cfu/ml. The suspension was standardized using a spectrophotometer (Bausch and Lomb Spectronic, Milton Roy, USA). The inoculum size was confirmed by performing viable cell counts.

Two types of commercially obtained intravascular catheters were used: polyvinyl chloride catheters (PVC) (Venocath 16, Abbott, Ireland) and Teflon catheters (Abbocath-T 16G, Abbott, Ireland). Segments (4 cm) of PVC and Teflon catheters were used for all experiments. Commercially obtained urinary catheters (Teflon-coated rubber) (Foley catheter, Laboratoires Bard, France) were cut into segments 4 cm long and into four equal strips. The external intravascular catheter surface area and the external and internal urinary catheter area vulnerable to bacterial adherence during exposure were calculated.

Adherence studies were carried out according to the method described by Sheth et al. (4). In short, segments of sterile catheter were placed in the bacterial suspensions for 2 min, removed with sterile forceps, shaken to remove excess fluid from the surface and inner lumen, and immersed in a tube containing 10 ml isotonic saline. The catheter segments were then removed and rinsed in a second tube of isotonic saline, this sequence being repeated for 12 rinses. Following the last rinse, the catheter segments were rolled directly on blood agar plates containing 1% Tween 80 in the manner described by Maki et al. (11). The plates were then incubated for 48 h and the resulting colonies were counted. Each experiment was

<table>
<thead>
<tr>
<th>Organism</th>
<th>PVC</th>
<th>Teflon</th>
<th>Statistical significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. urealyticum</em> ATCC 43044</td>
<td>293.5 ± 88.4</td>
<td>163.0 ± 62.7</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td><em>C. urealyticum</em> FJD 70</td>
<td>437.8 ± 95.3</td>
<td>281.9 ± 37.6</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td><em>C. jeikeium</em> FJD 89</td>
<td>152.2 ± 72.1</td>
<td>102.7 ± 48.2</td>
<td>NS</td>
</tr>
<tr>
<td><em>C. jeikeium</em> FJD 104</td>
<td>103.9 ± 37.8</td>
<td>166.6 ± 86.7</td>
<td>NS</td>
</tr>
<tr>
<td><em>C. xerosis</em> ATCC 373</td>
<td>352.5 ± 53.9</td>
<td>250.0 ± 74.7</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td><em>C. pseudodiphtheriticum</em> FJD 1</td>
<td>238.8 ± 79.6</td>
<td>146.0 ± 68.3</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td><em>S. epidermidis</em> FJD 5</td>
<td>78.1 ± 27.6</td>
<td>166.6 ± 84.4</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td><em>M. luteus</em> ATCC 9431</td>
<td>1.9 ± 1.6</td>
<td>25.1 ± 12.3</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

*Statistical significance by Student’s t test; NS: not significant.