TEM-producing *Capnocytophaga sputigena* primary bacteraemia in a breast cancer patient

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Introduction: Bacteraemia caused by *Capnocytophaga sputigena* is rarely reported. Here, we present a case of bacteraemia with *C. sputigena* in a breast cancer patient.

Case presentation: *C. sputigena* was isolated from blood in a breast cancer patient who suffered from oral mucosal barrier breakage for several years. The bacterium was initially identified in the blood culture of the patient by conventional techniques and confirmed by mass spectrometry and sequencing of the 16S rRNA gene. Antibiotics susceptible testing revealed the bacterium was resistant to penicillins, first-, second- and third-generation cephalosporins and monobactam. PCR was used to detect common β-lactamase genes; the TEM gene was detected and confirmed by sequencing.

Conclusion: To the best of our knowledge, this is the first report of bacteraemia in a breast cancer patient caused by TEM-producing *C. sputigena*.

Keywords: bacteraemia; *Capnocytophaga sputigena*; cephalosporins; TEM.
rRNA gene gave a product about 1500 bp using the following primers: F, 5'-CAGAGTTTGATCCTGGCT-3', and R, 5'-AGGAGGTGATCCAGCCGCA-3'. The sequencing result showed 100% nucleotide identity with the C. sputigena sequence in GenBank (accession no. AF133536) by BLAST analysis (http://blast.ncbi.nlm.nih.gov/).

Antimicrobial susceptibility was tested using automatic instrument methods (GNS-09, VITEK2 Compact; bioMérieux) and K-B disk diffusion method (Oxoid) on blood agar plates incubated for 48 h at 35 °C in 5% CO₂, and the results were interpreted using Clinical and Laboratory Standards Institute breakpoints for HACEK group infections. The bacterium showed resistance (with bacteriostatic diameter < 10 mm or MICs > 256 mg l⁻¹) to penicillin, ampicillin, cefuroxime, cefazolin, cefotaxime, ceftazidime, aztreonam, erythromycin, clindamycin, levofloxacin and tetracycline but susceptibility (with bacteriostatic diameter > 27 mm or MICs < 2 mg l⁻¹) to imipenem. β-Lactamase was positive using Cefinase (BD), and β-lactamase genes were detected by PCR, using a standard PCR protocol (denaturation for 4 min at 94 °C; 30 cycles of 45 s at 94 °C, 45 s at 55 °C and 1 min at 72 °C; and a final extension of 10 min at 72 °C). The primer sequences are given in Table 1. The PCR products showed that the organism was positive for the TEM gene (Fig. 2); it was confirmed as TEM (GenBank accession no. FJ223605) by DNA sequencing and a BLAST search.

**Discussion**

The growth of C. sputigena is very slow and needs fastidious conditions, strictly requiring CO₂. Thus, it is easy to escape examination in a clinical laboratory. The timely detection of C. sputigena plays an important role in the diagnosis of bloodstream infections, especially in patients with a damaged oral mucosa or who are immunocompromised. It is possible that the bacteraemia in this patient was caused by a lesion of the oral cavity, which allowed C. sputigena to pass into the bloodstream as a result of damage to the oral mucous membrane and induce infection of the blood.

C. sputigena was first reported and named in 1979, and was separated from other Capnocytophaga spp. on the basis of morphological and physiological characteristics (Leadbetter et al., 1979). Conventional methods can identify Capnocytophaga spp. only to the genus level. MALDI-TOF MS has been shown to provide rapid identification of bacteria and thus theoretically allow earlier intervention; it can identify Capnocytophaga to the species level quickly and easily, making it a powerful tool for bacterial identification.

Reports of C. sputigena carrying the TEM gene are rare. TEM-producing strains make treatment more difficult; the patient in this report was successfully cured by imipenem. To the best of our knowledge, this study is the first report of bacteraemia in a breast cancer patient caused by TEM-producing C. sputigena. It is important to focus on bloodstream infections caused by conditional pathogenic bacteria.

**Table 1.** PCR primers used in this study

<table>
<thead>
<tr>
<th>Primer</th>
<th>Sequence (5’→3’)</th>
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<tbody>
<tr>
<td>TEM</td>
<td>P1: ATAAAAATCTTGAAGACGAAA P2: GACAGTTACCAATGCTTAATCA</td>
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<tr>
<td>SHV</td>
<td>P1: GGTTATGGTTATATTTCC G2: TTAGCCTGCCAGTCGTC</td>
</tr>
<tr>
<td>VEB</td>
<td>P1: CGACTTCGATTTCCGATGCG P2: GGACTCTGCAACAAATACGC</td>
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<tr>
<td>CTX-M-1</td>
<td>P1: TCGTCCTTCCAGA P2: CAGCGTTCCGCTCTAG</td>
</tr>
<tr>
<td>CTX-M-2</td>
<td>P1: TTAATGATGACCTACGACCTTC P2: GATACCTGCTCCTATTATGC</td>
</tr>
<tr>
<td>CTX-M-8</td>
<td>P1: ACATCGCGTTGCTAGCGGAT P2: AACCCACAGTTGGTAGGC</td>
</tr>
<tr>
<td>CTX-M-9</td>
<td>P1: TATTTGGGAGTTGAGTAGTGT P2: TCCCTCAACTCGAGAAAATG</td>
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**Fig. 1.** Left: lump in right breast, size 7.4 × 5.0 cm. Right: lump in right axillary lymph node, size 1.9 × 1.3 cm.
Acknowledgements

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References


