Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Picture of a Microorganism

Unusual gram-positive spiral-shaped bacilli detected in a positive blood culture

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A 33-year-old man waiting for kidney transplant owing to end-stage chronic kidney disease was admitted to the intensive care unit with acute respiratory distress involving severe acute respiratory syndrome coronavirus 2, which had been diagnosed a few days earlier by RT-PCR. Of the four blood cultures sampled the day of his admission, one collected from a central venous catheter grew *Escherichia coli* within 1 day, as identified by matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS; Bruker Daltonics) [1].

Antimicrobial therapy with piperacillin-tazobactam was initiated. Two days later, three of the four blood cultures collected from an arterial catheter grew *Staphylococcus aureus*, and linezolid was added as empirical therapy. Antibiotic susceptibility was available the same day, and the antimicrobial regimen was switched to cefotaxime and cloxacillin. Four additional blood cultures were drawn before removal of the catheters, and one collected from the dialysis catheter tested positive within a period of 84 hours. Direct examination showed gram-positive spiral coiled rod bacilli (Fig. 1), which was confirmed by scanning electron microscopy (Fig. 2B and C) [2]. The blood culture was immediately analyzed by 16S rRNA sequencing [3], and the 935-bp amplicon generated shared 99.3% identity with *Clostridium saccharogumia* NR_043,550.

Colonies obtained from a pure subculture were also identified by MALDI-TOF MS as *C. saccharogumia,* with a log score of 2.3. The isolate was susceptible to amoxicillin, amoxicillin-clavulanate, piperacillin-tazobactam, imipenem, metronidazole, and clindamycin. Antimicrobial treatment with cefotaxime and cloxacillin was prolonged for 15 days with a favourable outcome, and a transthoracic echocardiography excluded infective endocarditis. Cultures of the arterial catheter, dialysis catheter and central catheter were negative.

C. saccharogumia was first isolated from human faeces in 2007 and, to the best of our knowledge, has never been found in clinical specimens. The fact that the bacterium is a strict anaerobe and was never identified before in our laboratory does not support the hypothesis of contamination. However, the source of the bacteraemia

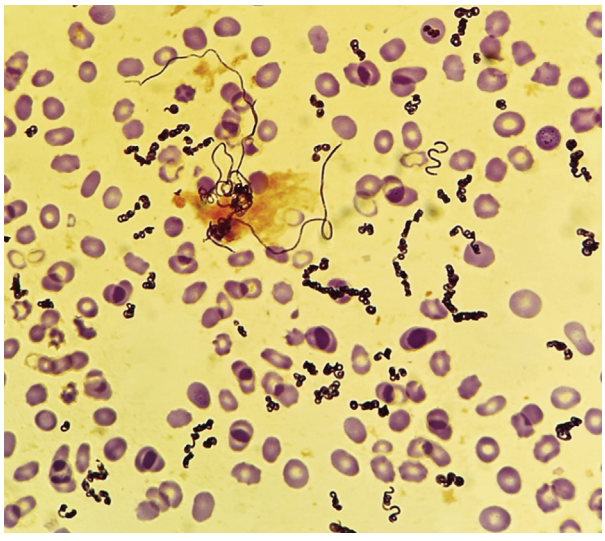

Fig. 1. Gram staining of the positive blood culture using a DM1000 photonic microscope (Leica Microsystems) under a 100 × oil-immersion objective lens, showing more or less coiled gram-positive bacteria. The colonies obtained in the pure subculture the following day were identified as *Clostridium saccharogumia*.

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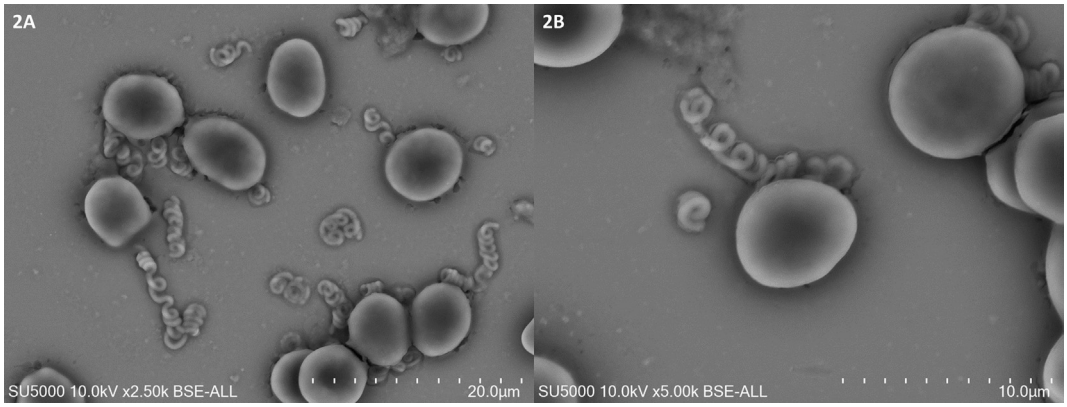

Fig. 2. Scanning electron microscopy micrographs of the positive blood culture generated using an SU5000 (Hitachi High-Tech Corporation). Slides were prepared as previously described [2].

remains unknown. The positive blood culture was collected from a dialysis catheter that was removed and for which the standard culture was negative. However, the culture was only performed under aerobic conditions, potentially leading to false-negative results.

Little is known about the human habitat of *C. saccharogumia*, but we hypothesize that the bacteraemia could be the result of an intermittent translocation of digestive tract flora rather than an infectious process. It is difficult to determine how previous antibiotic administration could have contributed to the presence of *C. saccharogumia* beacause no breakpoints are available for cloxacillin and cefotaxime. However, the patient received piperacillin-tazobactam, which is active against the isolate, thereby supporting the hypothesis of an intermittent bacterial translocation.

Because this morphology is unusual for a clostridial species, it could lead to misidentification based on microscopic observation, particularly from blood cultures. Clinical microbiologists should be aware that the observation of gram-positive helical-shaped rods could evoke the presence of *C. saccharogumia*.

Transparency declaration

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Author contributions

Conceptualization: DR, GD. Validation: DR, GD, MD. Investigation: MD, GD, DR. Resources: DR. Writing original draft: MD, GD. Review and editing: DR, GD. Visualization: MD, GD. Supervision: GD, DR.

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