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Emergence of NDM-1-producing *Acinetobacter pittii* in Brazil

Sir,

The New Delhi metallo-β-lactamase (NDM), initially reported in *Klebsiella pneumoniae* and *Escherichia coli*, is now disseminated worldwide mostly among Enterobacteriaceae [1]. The NDM carbapenemase has also been described in *Acinetobacter baumannii*, but only in sporadic cases in countries such as China, India, Egypt, Germany, Israel and, more recently, Brazil [1,2]. Noteworthy, recent studies reported NDM-producers among non-*baumannii Acinetobacter* spp., which may also be human pathogens. Here we report the first case of NDM-1-producing *Acinetobacter pittii* in Brazil.

A 66-year-old male patient with bladder carcinoma was admitted for radical cystectomy to a 900-bed tertiary care hospital in Porto Alegre, Southern Brazil, on 25 February 2013. Fifteen days later he presented an intestinal subocclusion and fever. Computerised tomography (CT) of the abdomen showed the presence of a collection in pelvis, which was drained surgically. This purulent secretion was cultured and a *K. pneumoniae* was identified (VITEK® 2 system; bioMérieux, La Balme-les-Grottes, France). Urine was also cultured and revealed the presence of *Candida* sp. (50 000 CFU/mL) and *Acinetobacter* sp. (>100 000 CFU/mL). The patient was treated with intravenous meropenem 500 mg every 12 h for 7 days, followed by cefepime 1 g every 24 h (doses adjusted to impaired renal function). Three subsequent urine cultures obtained 11, 28 and 44 days after the first culture were negative for *Acinetobacter* sp. The patient was therefore considered colonised by *Acinetobacter* sp. After 90 days the patient improved and was discharged from the hospital.

The *Acinetobacter* sp. isolate MP was identified as *A. pittii* by matrix-assisted laser desorption/ionisation time-of-flight (MALDI-TOF) (Bruker Daltonik, Bremen, Germany), *gyrB* multiplex PCR and 16S rRNA gene sequencing. Minimum inhibitory concentrations (MICs) of β-lactams, aminoglycosides, ciprofloxacin, fosfomycin, chloramphenicol, tigecycline, colistin and polymyxin B were determined (Etest® and microdilution method) and showed that the isolate was resistant to all β-lactams (with the exception of aztreonam), including carbapenems (MICs of imipenem, ertapenem, doripenem and meropenem >32 μg/mL). The isolate remained susceptible to amikacin, gentamicin, tigecycline, colistin, polymyxin B, ciprofloxacin and chloramphenicol. Carbapenemase genes were searched by real-time PCR ($bla_{\text{OXA-48}}$, bla_{KPC}, bla_{IMP}, bla_{VIM} and bla_{GES}) and multiplex PCR ($bla_{\text{OXA-23-like}}$, $bla_{\text{OXA-40-like}}$, $bla_{\text{OXA-58-like}}$ and $bla_{\text{OXA-143}}$). A positive signal was obtained only for the bla_{NDM} gene, and sequencing identified the $bla_{\text{NDM-1}}$ gene. To identify the location of this gene, electrotransformation assays were attempted using plasmid DNA extracts from *A. pittii* isolate MP using *A. baumannii* CIP7010 and *E. coli* TOP10 as recipients. Transfer of the $bla_{\text{NDM-1}}$ gene by electrotransformation into these two recipient strains remained unsuccessful, suggesting that the gene might be chromosomally located in *A. pittii* MP, as reported in *A. baumannii* [3].

The genetic environment of the $bla_{\text{NDM-1}}$ gene was determined by PCR mapping as described [3] and insertion sequence IS*Aba125* was identified upstream of the $bla_{\text{NDM-1}}$ gene. However, attempts to identify another copy of IS*Aba125* downstream of $bla_{\text{NDM-1}}$ remained unsuccessful, suggesting that the $bla_{\text{NDM-1}}$ gene might be part of a truncated Tn*125* transposon, as previously reported in *A. baumannii* [3]. Multilocus sequence typing (MLST) was performed according to the Institute Pasteur scheme (http://www.pasteur.fr) and *A. pittii* isolate MP was identified as ST119. Interestingly, two bla_{NDM}-positive *A. pittii* isolates were recently identified in Paraguay [4], a neighbouring country of Brazil, but those isolates belonged to ST320 and ST321. The only reports of *A. pittii* ST119 isolates are from Japan, with isolates producing the carbapenemase IMP-19 [1].

Identification of bla_{NDM}-positive non-*baumannii Acinetobacter* spp. is now increasingly reported worldwide, concomitantly with those of bla_{NDM}-positive *A. baumannii* isolates. There are few reports of NDM-producing *A. pittii*, being from China, Turkey and recently Paraguay. This is of particular concern considering that *Acinetobacter* sp. may (i) act as reservoirs for bla_{NDM} genes in non-human settings, as recently shown in several Chinese studies with identification of NDM-1-producers among *Acinetobacter calcoaceticus* and *Acinetobacter junii* from environmental samples from livestock farms [1], *Acinetobacter johnsonii* from hospital sewage [1] and *Acinetobacter lwoffii* from chickens [1], but also (ii) act as a source of bla_{NDM} genes then horizontally transferred to enterobacterial species as evidenced [5].

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Reference

[1] Bonnin RA, Poirel L, Nordmann P. New Delhi metallo-β-lactamase-producing *Acinetobacter baumannii*: a novel paradigm for spreading antibiotic resistance genes. Future Microbiol 2014;9:33–41.
[2] Pillonetto M, Arend L, Vespero EC, Pelisson M, Chagas TP, Carvalho-Assef AP, et al. First report of NDM-1-producing *Acinetobacter baumannii* sequence type 25 in Brazil. Antimicrob Agents Chemother 2014;58:7592–4.
[3] Poirel L, Bonnin RA, Boulanger A, Schrenzel J, Kaase M, Nordmann P. Tn125-related acquisition of $bla_{\text{NDM-like}}$ genes in *Acinetobacter baumannii*. Antimicrob Agents Chemother 2012;56:1087–9.
[4] Pasteran F, Mora MM, Albornoz E, Faccone D, Franco R, Ortellado J, et al. Emergence of genetically unrelated NDM-1-producing *Acinetobacter pittii* strains in Paraguay. J Antimicrob Chemother 2014;69:2575–8.
[5] Poirel L, Bonnin RA, Nordmann P. Analysis of the resistome of a multidrug-resistant NDM-1-producing *Escherichia coli* strain by high-throughput genome sequencing. Antimicrob Agents Chemother 2011;55:4224–9.

Mariana Pagano[a,b,c]
[a] *Medical and Molecular Microbiology Unit 'Emerging Antibiotic Resistance', Department of Medicine, Faculty of Science, University of Fribourg, 3 rue Albert-Gockel, CH-1700 Fribourg, Switzerland*
[b] *Programa de Pós Graduação em Ciências Farmacêutica, Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil*
[c] *Laboratório de Pesquisa em Resistência Bacteriana (LABRESIS), Centro de Pesquisa Experimental, Hospital de Clínicas de Porto Alegre (HCPA), Porto Alegre, Brazil*

Laurent Poirel[*]
Medical and Molecular Microbiology Unit 'Emerging Antibiotic Resistance', Department of Medicine, Faculty of Science, University of Fribourg, 3 rue Albert-Gockel, CH-1700 Fribourg, Switzerland

Andreza Francisco Martins[a,b]
Francieli P. Rozales[a,b]
[a] *Programa de Pós Graduação em Ciências Farmacêutica, Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil*
[b] *Laboratório de Pesquisa em Resistência Bacteriana (LABRESIS), Centro de Pesquisa Experimental, Hospital de Clínicas de Porto Alegre (HCPA), Porto Alegre, Brazil*

Alexandre Prehn Zavascki[a,b]
[a] *Programa de Pós Graduação em Ciências Farmacêutica, Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil*
[b] *Infectious Diseases Service, Hospital de Clínicas de Porto, Porto Alegre, Brazil*

Afonso Luis Barth[a,b]
[a] *Programa de Pós Graduação em Ciências Farmacêutica, Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil*
[b] *Laboratório de Pesquisa em Resistência Bacteriana (LABRESIS), Centro de Pesquisa Experimental, Hospital de Clínicas de Porto Alegre (HCPA), Porto Alegre, Brazil*

Patrice Nordmann[a,b]
[a] *Medical and Molecular Microbiology Unit 'Emerging Antibiotic Resistance', Department of Medicine, Faculty of Science, University of Fribourg, 3 rue Albert-Gockel, CH-1700 Fribourg, Switzerland*
[b] *HFR - Hôpital Cantonal de Fribourg, Fribourg, Switzerland*

[*] Corresponding author. Tel.: +41 26 300 9582.
E-mail address: laurent.poirel@unifr.ch (L. Poirel)

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