

Letter to the Editor

Identification of OXA-23 carbapenemases: novel variant OXA-239 in *Acinetobacter baumannii* ST758 clinical isolates in Mexico

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Abstract

A collection of 15 carbapenem-resistance *Acinetobacter baumannii* clinical isolates was analysed on two tertiary hospitals in Mexico. The OXA-51 was identified in all isolates, followed by OXA-239 and OXA-58; OXA-239 is described as a new OXA-23-like allele. These carbapenemases were identified on four clonal groups, distributed between two neighbouring hospitals. *Acinetobacter baumannii* is poorly studied in Mexico; this situation urges the implementation of strategies to prevent its dissemination.

Keywords: β -lactam antibiotics, carbapenem resistance, clonal dissemination, multidrug resistance, nosocomial infection

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Dear Editor,

In the past two decades, *Acinetobacter baumannii* has become a major pathogen, responsible for nosocomial infections. This pathogen displays high carbapenem resistance due to the production of carbapenemases, including the enzymes that contribute to the resistance to carbapenems, carbapenem-hydrolysing class D β -lactamases. Four groups have been

identified: *bla*OXA-51-like and three acquired ones (*bla*OXA-23-like, *bla*OXA-24-like and *bla*OXA-58-like) [1], however OXA-23 enzymes are found worldwide [2]. This study describes the characteristics of carbapenem-resistant *A. baumannii* clinical isolates in two tertiary-care hospitals in Mexico City.

A collection of 15 non-duplicate *A. baumannii* clinical isolates (one from each patient) was included. All of them were imipenem-resistant and so were the cause of nosocomial infections. They were collected between August and December 2010 at two hospitals belonging to the Centro Medico Nacional Siglo-XII (CMN-XXI): Oncology (ten isolates) and Cardiology (five isolates). The main isolation site corresponded to tracheal aspirates (46.6%; 7/15). The bacterial identification was carried out using API 20NE, and antimicrobial susceptibility was determined with the Phoenix system (Becton Dickinson Company, Sparks, MD), using the combined ID and AST NMIC/ID 104 panel for Gram-negative bacilli. The MIC to imipenem, meropenem, tigecycline and colistin were determined using the broth microdilution method following the CLSI recommendations [3]. All isolates were resistant to ampicillin, ceftazidime, ciprofloxacin, imipenem and meropenem, but they were susceptible to tigecycline (0.25 μ g/mL) and displayed a decreased susceptibility to colistin (2–4 μ g/mL) (Table 1). Clonal relatedness was determined by pulsed field gel electrophoresis and analysed according to the criteria proposed by Tenover *et al.* 1995 [4], using the GELCOMPAR II software (Applied Maths, Sint-Martens-Latem, Belgium). Four clonal groups (A–D) were identified: Clone A included five clinical isolates from the Cardiology hospital; the other minor clonal groups were obtained from the Oncology hospital (Table 1). The multilocus sequence typing (MLST) [5], was carried out in 8407 (clone A) and 8509 (clone B) isolates and the analysis performed on the *Acinetobacter* MLST website, (<http://pub-mlst.org>) showed that the sequence type (ST) was 758 (Table 1), corresponding to a new ST.

The phenotypic detection of metallo- β -lactamase production was achieved by means of a disc approximation screening test [3] and through a PCR assay for VIM, IMP, GIM, SPM and NDM-I genes, using generic primers as previously reported [6,7]; all the results were negative. To detect the class D carbapenemases (OXA-51, OXA-58, OXA-23 and OXA-24), a PCR assay was performed using specific primers [7]. All PCR-positive products were purified using a High Pure PCR Product Purification Kit (Roche Applied Science, Indianapolis, IN, USA); they were sequenced using the chain termination method with a Big-Dye Terminator kit (Applied Biosystems,

TABLE 1. Characteristics of carbapenem-resistant *Acinetobacter baumannii* clinical isolates

Strain	Hospital	PFGE	MLST (ST)	OXA-type	IMP	MEM	TIG	CL
8402	1	A	ND	51	32	16	<0.125	4
8404	1	A	ND	58, 51	32	16	<0.125	4
8400	1	A	ND	51	8	16	0.25	4
8407	1	A	758	239, 58, 51	32	32	0.5	4
8406	1	A	ND	51	32	32	0.5	4
8511	2	B	ND	239, 58, 51	32	8	1	4
8513	2	B	ND	51	32	8	1	2
8509	2	B	758	239, 51	32	8	1	4
8510	2	B	ND	239, 51	32	8	1	4
8508	2	B	ND	51	32	8	1	2
8506	2	C	ND	51	32	8	1	2
8516	2	C	ND	51	32	16	0.5	2
8517	2	C	ND	51	32	16	1	2
8514	2	D	ND	51	32	8	1	2
8515	2	D	ND	51	32	8	1	4

Abbreviations: CL, colistin; IMP, imipenem; MEM, meropenem; MLST, The MultiLocus Sequence Typing; ND, not determined; PFGE, pulsed field gel electrophoresis; ST, sequence type; TIG, tigecycline.

Hospitals: 1, Cardiology; 2, Oncology from Centro Medico Nacional Siglo-XII (CMN-XXI) in Mexico City.

Foster City, CA, USA) and analysed on an ABIPRISMA 3100 (Applied Biosystems). The nucleotide sequences were compared with the GenBank database by means of BLASTx searches. The OXA-51 gene was identified in all isolates, and in three and four isolates, respectively; OXA-58 and/or OXA-23-like genes were detected. In the OXA-23-like gene, three mutations were identified: S109L, D222N and P225S, corresponding to a new allele, OXA-239 (GenBank JQ837239) (<http://www.lahey.org/Studies/>) (Table 1). The genetic context of the OXA-type genes was analysed by PCR mapping, using ISAbal and OXA-23 primers [8]. The results showed that ISAbal was not associated to the OXA-51 gene, whereas the ISAbal sequence is flanking the OXA-239 gene, suggesting that its expression could be driven by the promoter present in this insertion sequence, as previously reported [9].

A new OXA-235 allele was described recently in one *A. baumannii* clinical isolate in Mexico [10], this study described another new OXA-23-like allele, OXA-239 gene in *A. baumannii* ST758 clinical isolates with different clonal origin from two tertiary-care hospitals from the same hospital complex in Mexico City. *Acinetobacter baumannii* has been poorly studied in Mexico; however, these studies show OXA enzyme diversification, highlighting the emergence of the new OXA-239 and for this and other reasons it is necessary to implement strategies to identify these kinds of isolates and prevent their dissemination.

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Conflict of Interest

None declared.

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