

First Report of OXA-23-Mediated Carbapenem Resistance in Sequence Type 2 Multidrug-Resistant *Acinetobacter baumannii* Associated with Urinary Tract Infection in a Cat

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Carbapenem resistance in multidrug-resistant *Acinetobacter baumannii* has been challenging human medicine (1, 2) and has also emerged in *Acinetobacter* spp. from animals; it is associated with the expression of OXA-23 in cattle and horses and NDM-1 in a porcine isolate (3–5). Yet, carbapenem resistance in *A. baumannii* from pets has been related only to overexpression of intrinsic genes (6). Here, we describe a multidrug-resistant *A. baumannii* isolate producing OXA-23 in a urinary tract infection (UTI) in a cat.

In 2009, a 3-year-old outdoor cat was presented with dysuria and hematuria at the Teaching Hospital of the FMV-UL. Aseptic urine culture revealed a significant *A. baumannii* bacteriuria; no other pathogens were found. The isolate was studied after the owner and the FMV-UL Ethics and Animal Welfare Committee gave approval. The cat had a 1.5-year history of skin and soft tissue infections, for which multiple courses of amoxicillin-clavulanate were prescribed. The cat was discharged before the culture result was available with an amoxicillin-clavulanate treatment *per os* for 20 days. We attempted to contact the owner without success. The animal was brought to the hospital 1 year later due to a hind limb trauma and had inexplicably recovered from the UTI.

The isolate (FMV6475/09) was identified using matrix-assisted laser desorption ionization–time of flight (MALDI-TOF) analysis (Bruker Daltonik). MICs were determined by broth microdilution using the Sensititre ESB1F and EUMVS2 plates (Trek Diagnostic Systems) according to CLSI guidelines (7). The antibiotic resistance genes were detected using the version 08 AMR-ve microarray (Alere Technologies), an update of Card et al. (8). PCRs were performed for several acquired carbapenemase genes (9), for ISAbal1 upstream of the intrinsic carbapenemase genes bla_{OXA-51-like} and bla_{ADC}, and for sequences upstream and downstream of bla_{OXA-23} using specific primers (9–11) as well as a primer annealing at the 3' end of ISAbal1 (ISAbal1-3'-R, 5'-TCACAGAACCCTTATCCTATC). Mutations in the quinolone resistance-determining region of gyrA and parC were detected as described previously (6). Multilocus sequence typing (MLST) was according to the recommendations given by the *A. baumannii* MLST database (<http://www.pasteur.fr/recherche/genopole/PF8/mlst/Abaumannii.html>). Conjugation was performed using *A. baumannii* BM4547 (kindly provided by L. Poirel and P. Nordmann) as the recipient and 1 µg/ml imipenem in the selective plates.

Strain FMV6475/09 was susceptible to gentamicin (MIC, 4 µg/ml), kanamycin (MIC, ≤4 µg/ml), and colistin (MIC, ≤2 µg/ml). The high MICs of meropenem, imipenem (MIC, >8 µg/ml), ceftazidime, cefepime, cefpodoxime, cefotaxime, ceftriaxone (MIC, >16 µg/ml), piperacillin-tazobactam, cefotaxime-clavulanic acid (MICs, >64, >4 µg/ml) and ceftazidime-clavulanic acid (MICs,

64, 4 µg/ml) were associated with the production of OXA-23 (1). The strain also contained ISAbal1 upstream of bla_{ADC}, which enhances expression of the chromosomally encoded ADC cephalosporinase (12). Additional resistances were attributed to sul2 (sulfamethoxazole MIC, >1,024 µg/ml), tet(B) (tetracycline MIC, >64 µg/ml), strA, and strB (streptomycin MIC, >128 µg/ml) and to mutations in gyrA (Ser83Leu) and parC (Ser80Leu) (ciprofloxacin MIC, >8 µg/ml). Resistance to chloramphenicol and trimethoprim (MIC, >64 µg/ml) could not be attributed to the genes cata1, catIII, catB3-like, catB8, cmlA, or floR and dfrA1, dfrA7, dfrA12, dfrA13, dfrA14, dfrA17, or dfrA19, respectively. The bla_{OXA-23} gene was localized on the chromosome by DNA-DNA hybridization and could not be transferred by conjugation. It was flanked by two copies of intact ISAbal1, and sequences of this region (EMBL accession no. HG797027) indicated its location on transposon Tn2006 and not on Tn2008, as has been found in cattle and horses (3, 4). Strain FMV6475/09 belonged to sequence type 2, which has been associated with European clone II. In the same time frame, this worldwide-disseminated clone (2) also containing bla_{OXA-23} on Tn2006 was endemic in Portuguese hospitals (13, 14), suggesting a possible human-to-animal transmission.

This is the first report of an OXA-23 carbapenem-hydrolyzing enzyme in *A. baumannii* from an infection in a pet. Companion animals may harbor carbapenemase-producing bacteria, which represents an additional veterinary and public health hazard.

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