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► **To cite this version:**

Ahmad Al Atrouni, Marie-Laure Joly-Guillou, Monzer Hamze, Marie Kempf. Emergence of NDM-1 and OXA-72 producing *Acinetobacter pittii* clinical isolates in Lebanon. *New Microbes and New Infections*, 2016, 12, pp.43 - 44. 10.1016/j.nmni.2016.04.005 . inserm-01822432

**HAL Id: inserm-01822432**

**<https://inserm.hal.science/inserm-01822432>**

Submitted on 25 Jun 2018

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## Emergence of NDM-1 and OXA-72 producing *Acinetobacter pittii* clinical isolates in Lebanon

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### Abstract

*Acinetobacter* spp. have emerged as global opportunistic pathogen causing a wide range of infections. Emergence of carbapenem resistance in these organisms is a matter of great concern. We report here the first detection of *Acinetobacter pittii* clinical isolates in Lebanon carrying either the *bla*<sub>NDM-1</sub> or the *bla*<sub>OXA-72</sub> gene.

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**Keywords:** *Acinetobacter pittii*, *bla*<sub>NDM-1</sub>, *bla*<sub>Oxa-72</sub>, carbapenem resistance, Lebanon

**Original Submission:** 2 March 2016; **Accepted:** 14 April 2016

**Article published online:** 22 April 2016

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The genus *Acinetobacter* comprises to date more than 50 species, among which *Acinetobacter baumannii* is the most clinically relevant, often associated with pneumonia, septicaemia, urinary tract infections, wound infections and meningitis [1]. Treatment of infections caused by this opportunistic bacterium is a challenge as a result of its strong ability to develop resistance to a wide range of antimicrobial agents, especially carbapenems. This resistance trait is mainly related to production of acquired carbapenem-hydrolyzing class D  $\beta$ -lactamases and metallo- $\beta$ -lactamases [2]. In the last decades, the role of non-*baumannii* *Acinetobacter* in human infections has been increasingly recognized as a result of advances in molecular biology [3]. There are several reports of multidrug-resistant strains of *Acinetobacter pittii* and *Acinetobacter nosocomialis* in healthcare facilities around the world [4].

This study was initiated by the isolation of two imipenem-resistant *A. pittii* strains recovered in two hospitals in Tripoli, North Lebanon, in 2015. The first one, designated CMUL332,

was isolated from the urine of a 4-month-old child who was admitted to the intensive care unit for fever and nephritic syndrome. The second one, CMUL334, was isolated from the urine of a 15-year-old girl patient hospitalized with febrile gastroenteritis. Bacterial identification was performed by matrix-assisted desorption ionization–time of flight mass spectrometry and partial *rpoB* gene sequencing [5]. Antimicrobial susceptibility was determined by the disk diffusion method according to the recommendations of the European Committee on Antimicrobial Susceptibility Testing (<http://www.eucast.org>). Both isolates were resistant to ticarcillin, ticarcillin/clavulanate and ceftazidime and were of intermediate susceptibility to piperacillin/tazobactam. In contrast, they remained susceptible to aminosides, tigecycline, rifampin, ciprofloxacin and colistin, except strain CMUL332, which was resistant to tobramycin and netilmicin. The Etest method confirmed the carbapenem-resistant phenotype because the minimum inhibitory concentration for meropenem was >32 mg/L and for imipenem either >32 mg/L (CMUL332) or 16 mg/L (CMUL334). Screening of *bla*<sub>OXA-23-like</sub>, *bla*<sub>OXA-24-like</sub>, *bla*<sub>OXA-58-like</sub> and *bla*<sub>NDM</sub> genes by real-time PCR revealed that CMUL332 harboured the *bla*<sub>NDM</sub> gene, while CMUL334 carried the *bla*<sub>OXA-24 like</sub> gene. Sequencing of the entire carbapenemase

genes showed that they encoded for NDM-I and OXA-72 variants, respectively.

OXA-72-producing *A. pittii* was first described in Colombia in 2012 from a catheter tip–positive culture of a patient who had ischaemic hepatitis and multiorgan failure [6]. This enzyme has subsequently been reported from carbapenem-resistant clinical isolates of *A. pittii* in France [7]. On the other hand, identification of NDM-positive non-*baumannii* *Acinetobacter* is now increasingly reported worldwide, concomitantly with those of *A. baumannii* isolates. Indeed, recent studies have demonstrated the emergence and the dissemination of NDM-I-producing *A. pittii* in several countries, including China [4,8], Turkey [9] and recently Brazil [10].

This study is the first report of *A. pittii* producing OXA-72 and NDM-I in Lebanon, which highlights the clinical relevance of this bacterium, in accordance with a series of recent studies [3]. Therefore, surveillance is warranted, and early detection of carbapenemase genes is recommended to avoid their major spread to more clinically relevant bacterial species.

## Acknowledgements

This work was supported by the Lebanese University and the National Council for Scientific Research, Lebanon. The authors thank T. Abdou, M. Yehya, M. Akko and A. Borghol for their technical assistance.

## Conflict of Interest

None declared.

## References

- [1] Peleg AY, Seifert H, Paterson DL. *Acinetobacter baumannii*: emergence of a successful pathogen. *Clin Microbiol Rev* 2008;21:538–82.
- [2] Kempf M, Rolain JM. Emergence of resistance to carbapenems in *Acinetobacter baumannii* in Europe: clinical impact and therapeutic options. *Int J Antimicrob Agents* 2012;39:105–14.
- [3] Al Atrouni A, Joly-Guillou ML, Hamze M, Kempf M. Reservoirs of non-*baumannii* *Acinetobacter* species. *Front Microbiol* 2016;7:49.
- [4] Zhang R, Hu YY, Yang XF, Gu DX, Zhou HW, Hu QF, et al. Emergence of NDM-producing non-*baumannii* *Acinetobacter* spp. isolated from China. *Eur J Clin Microbiol Infect Dis* 2014;33:853–60.
- [5] Gundi VA, Dijkshoorn L, Burignat S, Raoult D, La Scola B. Validation of partial *rpoB* gene sequence analysis for the identification of clinically important and emerging *Acinetobacter* species. *Microbiology* 2009;155:2333–41.
- [6] Montealegre MC, Maya JJ, Correa A, Espinal P, Mojica MF, Ruiz SJ, et al. First identification of OXA-72 carbapenemase from *Acinetobacter pittii* in Colombia. *Antimicrob Agents Chemother* 2012;56:3996–8.
- [7] Bonnin RA, Docobo-Pérez F, Poirel L, Villegas MV, Nordmann P. Emergence of OXA-72-producing *Acinetobacter pittii* clinical isolates. *Int J Antimicrob Agents* 2014;43:195–6.
- [8] Yang J, Chen Y, Jia X, Luo Y, Song Q, Zhao W, et al. Dissemination and characterization of NDM-I-producing *Acinetobacter pittii* in an intensive care unit in China. *Clin Microbiol Infect* 2012;18:E506–13.
- [9] Roca I, Mosqueda N, Altun B, Espinal P, Akova M, Vila J. Molecular characterization of NDM-I-producing *Acinetobacter pittii* isolated from Turkey in 2006. *J Antimicrob Chemother* 2014;69:3437–8.
- [10] Pagano M, Poirel L, Martins AF, Rozales FP, Zavascki AP, Barth AL, et al. Emergence of NDM-I-producing *Acinetobacter pittii* in Brazil. *Int J Antimicrob Agents* 2015;45:444–5.