First report of Oxa-72-producing *Acinetobacter calcoaceticus* in Lebanon

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Abstract

Emergence of carbapenem-resistant *Acinetobacter* spp. has been increasingly reported worldwide. We report here the first detection of an *Acinetobacter calcoaceticus* isolate from vegetables in Lebanon carrying the bla_{Oxa-72} gene. These findings show that the Lebanese environment may constitute a potential reservoir for this antibiotic resistance gene.

Keywords: *Acinetobacter calcoaceticus*, bla_{Oxa-72}, carbapenem resistance, Lebanon, vegetables
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Acinetobacter calcoaceticus is a Gram-negative aerobic bacterium that belongs to the *Acinetobacter calcoaceticus–Acinetobacter baumannii* complex [1]. It is ubiquitous in nature and can be isolated from soil samples and vegetables [2,3]. Even if *A. baumannii* is more able to cause infections with high mortality and morbidity, the role of *A. calcoaceticus* in nosocomial infections should not be underrated [4,5]. Carbapenems have been widely used to treat infections caused by multidrug-resistant *Acinetobacter*. However, resistance to carbapenems among this genus has been increasingly reported during the last years, especially in *A. baumannii,* and is becoming a serious public health problem worldwide. Carbapenem-hydrolyzing class D β-lactamases and metallo-β-lactamases are the most frequently encountered enzymes within this genus [6]. Several studies have reported the isolation of carbapenem-resistant *A. calcoaceticus* from clinical and environmental samples [3,5,7].

In the present study, two imipenem-resistant *A. calcoaceticus* strains isolated in Lebanon from vegetables were analysed. Bacterial identification was initially performed by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF) and confirmed at the species level by partial *rpo*B gene sequencing, as previously described [2]. 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). Resistance to imipenem and meropenem was confirmed by the Etest method. Etest results confirmed the carbapenem-resistant phenotype because the minimum inhibitory concentrations for imipenem and meropenem were 16 mg/L. In addition, both strains remained susceptible against piperacillin/tazobactam, ceftazidime, aminosides, tigecycline, rifampin, ciprofloxacin and colistin.

Screening of $bla_{OXA-23-like}$, $bla_{OXA-24-like}$ and $bla_{OXA-58-like}$ genes by real-time PCR revealed that both isolates carried the $bla_{OXA-24-like}$ gene and were negative for the other carbapenemase genes tested. Sequencing of the $bla_{Oxa-24-like}$ gene showed that it encoded for the Oxa-72 variant. This variant was first described in 2004 in an *A. baumannii* isolate sampled in Thailand (GenBank accession no. AY739646.1). Since then, the variant has been reported worldwide from carbapenem-resistant clinical isolates of *Acinetobacter* spp. but has never been described in *A. calcoaceticus* [8,9]. In our study, we found for the first time the presence of the bla_{Oxa-72} variant in *A. calcoaceticus* isolated in Lebanon from two vegetables purchased from the same market in Beirut. Isolation of this multidrug-resistant bacterium may reflect a possible contamination of the environment surrounding the agriculture zones, such as irrigation water or the soil itself, or it may highlight the potential role of animals as a possible contributor of contamination.

One can presume that isolation of such multidrug-resistant bacteria in such an environment may be in part due to the uncontrolled use of antimicrobial agents, either in the food chain or to treat both humans and animals. Thus, this phenomenon could constitute a selective pressure for

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environmental bacteria, which then consequently makes the environment a potential reservoir for antibiotic resistance genes [10]. Therefore, appropriate strategies should be implemented to avoid excessive use of antimicrobial agents and to limit environmental contamination with multidrug-resistant bacteria.

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Conflict of Interest

None declared.

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