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International Transfer of NDM-1-Producing *Klebsiella pneumoniae* from Iraq to France▽

The carbapenemase NDM-1 was initially identified in *Escherichia* and *Klebsiella pneumoniae* in Sweden from a patient transferred from India (10). Since then, it has been identified in many enterobacterial species and isolates from patients in the United Kingdom, India, and Pakistan (4). In addition, recent reports have indicated the spread of NDM-1 producers in many different countries, including Austria, Australia, Belgium, Canada, Denmark, France, Germany, Kenya, the Netherlands, Norway, the Sultanate of Oman, and the United States (6–9). Most of these reports indicated a likely source of NDM-1 producers located in the Indian subcontinent, with both hospital and community acquisition. However, a detailed analysis of the clinical cases indicated that importation of NDM-1 isolates may also have originated from Balkan countries, such as Kosovo, Serbia, Montenegro, and Bosnia and Herzegovina, which may constitute an additional reservoir for NDM-1 producers (6).

A 22-year-old Iraqi male resident in Baghdad was admitted at the Bicêtre Hospital (suburb of Paris) on 8 November 2010, following a direct transfer from Baghdad, Iraq. He had been a victim of a terrorist attack at the Baghdad cathedral that killed over 50 people on 31 October 2010. He had a wounded shoulder and was immediately hospitalized at the Ibn Al Nafees Hospital of Baghdad, where he was operated on and stayed for 5 days. At the Bicêtre Hospital, he was screened for multidrug-resistant bacteria, including extended-spectrum β-lactamase (ESBL) and carbapenemase producers, methicillin-resistant *Staphylococcus aureus*, and glycopeptide-resistant enterococci. Rectal swabs grew only on ChromID ESBL culture medium (bioMérieux, La Balme-les-Grottes, France) (5). *K. pneumoniae* isolate IBN was obtained, which showed resistance or decreased susceptibility to all β-lactams, including carbapenems (the MICs of imipenem, ertapenem, doripenem, and meropenem were 2, 8, 2, and 3 μg/ml, respectively), according to the CLSI's updated guidelines (1). It was also resistant to gentamicin, kanamycin, tobramycin, sulfonamides, rifampin, chloramphenicol, and fluoroquinolones but remained susceptible to amikacin and fosfomycin, the MICs of tigecycline and colistin being 0.25 and 0.5 μg/ml, respectively. The patient did not develop any infection while hospitalized in France. He was neither treated with antibiotics nor decontaminated (actually not recommended for carriage of multidrug-resistant *Enterobacteriaceae*).

PCR, sequencing, and plasmid analysis revealed that *K. pneumoniae* IBN harbored the $bla_{\text{NDM-1}}$ carbapenemase gene, in addition to a $bla_{\text{CTX-M-15}}$ ESBL gene, each located on a different plasmid (100 and 160 kb in size, respectively). Screening for additional β-lactamase genes and for 16S RNA methylase genes, as reported previously (9), showed that *K. pneumoniae* IBN was coharboring the $bla_{\text{SHV-11}}$ and $bla_{\text{OXA-1}}$ genes, but no 16S RNA methylase gene was identified. Multilocus sequence typing was performed as described worldwide (3) to evidence a possible link with other recently identified NDM-1-producing *K. pneumoniae* isolates, and the results were analyzed by eBURST (http://pubmlst.org). The results showed that isolate IBN belonged to the ST147 sequence type, whereas the NDM-1-positive *K. pneumoniae* 05-506 index strain and *K. pneumoniae* isolates recovered in India and in the Sultanate of Oman belonged to the ST14 type, both types differing significantly (2, 7). Interestingly, the only report of ST147-type *K. pneumoniae* so far corresponds to a clonal spread that has been identified in Hungary (2). This Hungarian ST147 clone was susceptible to carbapenems, but it harbored a $bla_{\text{CTX-M-15}}$ plasmid and was resistant to fluoroquinolones (2), as observed for isolate IBN from Iraq. It may therefore be speculated that these isolates could be clonally related.

Considering that one of the two NDM-1-producing *K. pneumoniae* isolates previously identified from Oman could not be traced back to the Indian subcontinent, this report provides an additional clue that the Middle East might also be a reservoir for NDM-1 producers. This result should be taken in account when taking care of any civilian or soldier hospitalized in Iraq and transferred abroad. It also suggests that the spread of NDM-1 producers is already much wider than suspected. Finally, it strengthens the value of systematic screening for multidrug-resistant bacteria for preventing the development of nosocomial outbreaks of carbapenem-resistant *Enterobacteriaceae*, as recommended in reference 6.

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