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Letter to the Editor

First characterization of *bla*$_{VIM-11}$ cassette-containing integron in metallo-β-lactamase producing *Pseudomonas aeruginosa* in Malaysia

Dear Editor,

Mechanism of resistance to carbapenems in *Pseudomonas aeruginosa* can be due to the presence of class B β-lactamases, the metallo-β-lactamases (MBLs). To date, multiple allelic variants, namely VIM-2 to VIM-10 have been reported (http://www.lahey.org/studies/). The multiple allelic variants of VIM family in *Pseudomonas aeruginosa* have been described in Europe, Asia and America[3] developing a wide distribution. Unlike VIM-2 novel variant of VIM family, VIM-11 in *P. aeruginosa* has only been reported from a few countries, such as Argentina[6], Italy (*bla*$_{VIM-11}$) GeneBank accession no. (AY635904), Taiwan[5] and India[1]. Of particular importance, this *bla*$_{VIM-11}$ gene has been located in class 1 integron residing on mobile plasmids, indicating the ability for horizontal transfer between species. In this present study, as the first report from Malaysia, we report, a *bla*$_{VIM-11}$ harboring class 1 integron from a carbapenem-resistant *P. aeruginosa* clinical strain which was isolated from a patient admitted to University Malaya Medical Center (UMMC) in Kuala Lumpur, Malaysia.

In October 2005, a 25-year-old male developed severe neurological deficit with fits and irrational behavior, following 5 days of fever. He was hospitalized for 31 days for treatment of epilepsy in intensive care unit (ICU) ward. He received multiple antibacterial treatments, which included imipenem for 12 days. Two weeks after hospitalisation, the patient developed septic shock with high fever and nausea. Four days later an imipenem-resistant *P. aeruginosa* strain 1492304 was isolated from his tracheal secretion. The isolate was susceptible to polymyxin, but resistant to multiple antibiotics including gentamicin, amikacin, cefoperazone, ceftazidime, piperacillin, ciprofloxacin and netilmicin. The minimum inhibitory concentration (MIC) of imipenem of this isolate was >32 mg/ml as determined by Etest, (AB Biodisk, Solna, Sweden). Phenotypic detection of MBL was achieved by double disk synergy test (DDST) using imipenem as the substrate and ethylene diamine tetraacetic acid (EDTA) as the MBL inhibitor[4]. An MBL Etest strip (AB-Biodisk, Solna, Sweden) was used to confirm the screening test result. Detection of MBL genes was performed by PCR amplification followed by sequencing using an automated DNA sequencer (ABI prism DNA sequencer, Perkin Elmer ABI, Wellesley, MA, USA). Nucleotide sequences were analyzed and compared by use of the BLAST computer program (National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov). To determine the integron, degenerated primers, hep35 and hep36 which were reported by Gu *et al*[2] were used to amplify the conserved region of the integerase gene. The PCR product was subjected to *Hinf*I (MBI Fermentas, Vilnius, Lithuania) restriction enzyme analysis. To investigate the integron structure encoding *bla*$_{VIM-11}$ PCR amplification was performed using 5'CS/VIM-R and VIM-R/3'CS combination primers. This fragment integrated the attI1 recombination site (59bp) in the first position and immediately flowed by the single cassette of *bla*$_{VIM-11}$ conferring resistance to β-lactam antibiotics. The nucleotide sequence of *bla*$_{VIM-11}$ and class 1 integron of *bla*$_{VIM-11}$ has been assigned GeneBank no GQ221779 and GU213191.

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This is the first report of *bla*$_{VIM-11}$ carrying by integron class 1 *P. aeruginosa* isolate from a patient in Malaysia and the Southeast Asia region and highlights the possibility of rapid dissemination of this important resistance mechanism in this geographical region.

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