

**Título:** Spread of *bla*VIM genes on Brazilian soil

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The group of metallo- $\beta$ -lactamases (MBLs) comprises the most significant carbapenemases which are classified as Ambler class B. These enzymes are found in many clinical bacteria species; however, there is little description of these enzymes in environmental isolates. The goal of this work was to isolate imipenem resistant bacteria from soil samples, to determine the main bacterial genus and species obtained with resistance profile to this carbapenem and other  $\beta$ -lactams, to establish if the mechanism of resistance was due to production of metallo- $\beta$ -lactamases, and to determine which is the most prevalent MBL detected. The isolates were isolated from soil samples and identified by sequencing of the 16S rDNA gene. The antimicrobial susceptibility test was performed by disc diffusion on Müller–Hinton agar (Oxoid, UK) in accordance with the recommendations of the Clinical Laboratory Standards Institute (CLSI 2013) recommendations. The phenotypic detection of MBL was carried out using disks of imipenem (10 $\mu$ g) with and without EDTA (10 mol L<sup>-1</sup>). A difference  $\geq$ 5 mm between the halos indicates the production of MBL. Molecular screening for different metallo- $\beta$ -lactamases and integrons were performed by PCR and the amplicons were sequenced in both strands by an automated sequencer. Isolation of plasmid DNA was performed by the alkaline lysis. The results demonstrated that the antimicrobial profile of 63 soil isolates from all Brazilian regions, 48 (76.2%) of them were multidrug resistant and all of them were imipenem resistant. Among the 63 isolates, 19 Gram-positive bacteria amplified for *bla*VIM gene and class 1 integrons by Polymerase Chain Reaction (PCR). Six of the 19 isolates were identified as *Paenibacillus* sp., 12 as *Bacillus* sp., and just one was classified as *Staphylococcus* sp., by sequencing of the 16S rDNA gene. These results suggest that bacteria from soil can act as a source of MBL genes, representing a threat to public health.

**Keywords:** Metallo- $\beta$ -lactamase, *bla*VIM, soil, antimicrobial resistance.

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