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First Report of a Nonmetallocarbapenemase Class A Carbapenemase in an *Enterobacter cloacae* Isolate from Colombia

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Carbapenemases are a growing concern worldwide since they threaten the efficacy of carbapenems, the most potent β-lactam antibiotics. Nonmetallocarbapenemase class A (NMC-A) was identified in 1990 from a clinical isolate of *Enterobacter cloacae*, and since its first report in France (1), this rare enzyme has been found only in the United States (Seattle, WA, and New York, NY), Argentina, and Finland (2–5). Herein, we describe for the first time in Colombia an *E. cloacae* isolate harboring an NMC-A carbapenemase.

In December 2009 in Barranquilla, Colombia, a 66-year-old woman presented to the emergency room with a 6-day history of abdominal pain, bloating, and vomiting. She was diagnosed with an intestinal obstruction and was subjected to an exploratory laparotomy and sigmoidectomy. The histological examination of the sigmoid showed an invasive adenocarcinoma. After 4 days of empirical treatment with imipenem (500 mg intravenously every 6 h) for peritonitis, a culture of peritoneal fluid showed a carbapenem-resistant *E. cloacae* isolate (D5178). Despite multiple peritoneal lavages and antibiotic treatment with ciprofloxacin, meropenem, and then cefepime, the patient showed no clinical improvement and died of a cardiac arrhythmia after 1 month of hospitalization.

Strain D5178 was sent to CIDEIM's laboratory as part of a bacterial resistance surveillance program that includes 14 hospitals throughout the country. Upon its arrival, species identification was corroborated using Vitek 2 (bioMérieux, Mercy l'Etoile, France), and antibiotic susceptibility testing was performed using the broth microdilution method (Sensititre panels; TREK Diagnostic Systems, Westlake, Ohio, USA), as well as the disk diffusion test. According to 2012 CLSI breakpoints (6), the isolate showed susceptibility to expanded-spectrum cephalosporins, cefepime, amikacin, aztreonam, piperacillin-tazobactam, polymyxin B, and tigecycline and resistance to cefoxitin, ciprofloxacin, and all carbapenems (ertapenem MIC, 16 μg/ml; imipenem MIC, 32 μg/ml; meropenem MIC, 8 μg/ml; and doripenem MIC, 8 μg/ml). An extended-spectrum-β-lactamase (ESBL) double-disk confirmatory test was negative; however, a modified Hodge test and three-dimensional bioassay using an imipenem disk were positive (6, 7). Additionally, the double-disk synergy tests showed increases in the sizes of the zones of inhibition around ertapenem, imipenem, and meropenem toward clavulanate, suggesting the presence of a serine carbapenemase (2). PCRs used to screen for $bla_{\text{CTX-M}}$, bla_{TEM}, bla_{SHV}, bla_{IMP}, bla_{PER}, bla_{GES}, bla_{VEB}, bla_{KPC}, bla_{VIM}, and bla_{NDM} were negative. Given that the isolate was identified as *E. cloacae*, we also screened for bla_{NMC} using previously described primers (2) targeting the gene and its regulator, which gave a positive result. In order to corroborate the gene's identity, the entire region was amplified, cloned into a TOPOTA vector, and sequenced using M13 primers. BLAST analysis showed that it matched GenBank sequence Z21956.1.

This is the first report of a clinical *E. cloacae* isolate harboring an NMC-A carbapenemase in Colombia. Despite the increasing global dissemination of the plasmidic carbapenemases, a chromosomally encoded NMC-A carbapenemase is a rare finding. However, isolates carrying such an enzyme remain relevant, especially since NMC-A carbapenemases are able to hydrolyze carbapenems and their expression has proved to be inducible and coregulated with AmpC (8, 9). The continued emergence of novel mechanisms of resistance to carbapenems worldwide reemphasizes the need to continue screening for carbapenemases in order to determine the appropriate treatment and optimize antibiotic use.

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