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Complete Genome Sequence of a Colistin-Resistant *Escherichia coli* Strain Harboring *mcr-1* on an IncHI2 Plasmid in the United States

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ABSTRACT We report here the incidental detection and complete genome sequence of a urinary *Escherichia coli* strain harboring *mcr-1* and resistant to colistin in a New York patient returning from Portugal in 2016. This strain, with sequence type 1485 (ST1485), was a non-extended-spectrum beta-lactamase (ESBL) and non-carbapenemase producer and carried the *mcr-1* gene on an IncHI2 plasmid.

The emergence of plasmid-mediated colistin resistance, associated with the *mcr-1* gene, was first reported in China in November 2015 (1). This gene has now been detected in more than 30 countries worldwide (2). As of 1 June 2017, 14 human cases have been reported from 9 U.S. states (<https://www.cdc.gov/drugresistance/tracking-mcr1.html>). Here, we report the complete genome sequence of an *mcr-1*-carrying *Escherichia coli* strain, which was incidentally detected from a New York state patient returning from Portugal in 2016.

The patient, a 51-year-old woman with history of ovarian cancer, was admitted in November 2016 for right lower extremity cellulitis and an upper respiratory tract infection. Three sets of blood cultures were negative for bacteria and fungi. A urine culture collected on the day of admission grew a non-extended-spectrum beta-lactamase (ESBL)- and non-carbapenemase-producing *E. coli* (strain M160133), which was incidentally included in a prospective surveillance study for *mcr-1* and was confirmed to carry *mcr-1* by an in-house real-time PCR assay. The patient had no history of receiving any polymyxins. She had traveled to the city of Coimbra, Portugal, in the summer of 2016 and stayed on a farm with chickens and pigs for 7 weeks.

E. coli strain M160133 was resistant to colistin, with an MIC of 4 $\mu\text{g/ml}$ by Etest (bioMérieux, Durham, NC). Unlike other *mcr-1*-carrying *E. coli* strains reported in the United States, M160133 was resistant to ampicillin, ciprofloxacin, levofloxacin, tetracycline, and trimethoprim-sulfamethoxazole but was susceptible to the third- and fourth-generation cephalosporins, carbapenems, and tigecycline (3–8). The genome sequence was constructed on the basis of next-generation sequencing data from the MiSeq (Illumina) and RSII single-molecule real-time (SMRT) (Pacific Biosciences) systems, as described previously (9).

The complete genome of *E. coli* strain M160133 with sequence type 1485 (ST1485) consists of one 4.96-Mb chromosome and three plasmids with sizes of 233,149 bp (pM160133-p1), 173,624 bp (pM160133-p2), and 113,428 bp (pM160133-p3). Plasmid pM160133-p1 carries the *mcr-1* gene and belongs to incompatibility group IncHI2 (10).

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In addition to *mcr-1*, resistance genes *aadA2*, *dfrA12*, *floR*, *strA*, and *tet(M)* were also identified on this plasmid. Plasmid pM160133-p2 carried resistant genes *bla*_{TEM-1B}, *dfrA14*, *sul2*, *strB*, and *tet(A)*. No resistance genes were identified on plasmid pM160133-p3. Sequence BLAST analysis demonstrated that the IncHI2 plasmid pM160133-p1 shared >90% nucleotide identity to plasmids pHNSHP45-2 (*E. coli* isolate SHP45 from China, GenBank accession no. KU341381) (1), p14008_M1 (*E. coli* isolate NRZ14408 from Germany, accession no. LT599829), and pS38 (*E. coli* isolate S38, accession no. KX129782) (11).

In summary, we report the detection of a urinary *E. coli* strain harboring *mcr-1* and resistant to colistin in a New York patient returning from Portugal in 2016. This is the first report of a non-ESBL-producing non-carbapenemase-producing *E. coli* strain sheltering *mcr-1* on an IncHI2 plasmid in the United States, which raises a new challenge to current practice by testing isolates for *mcr-1*-mediated colistin resistance mainly in ESBL-producing *Enterobacteriaceae*.

Accession number(s). The complete genome sequence of strain M160133 has been deposited to GenBank under accession no. [CP022164](#) for the chromosome, [CP022165](#) for the *mcr-1*-carrying plasmid pM160133_p1, [CP022166](#) for the pM160133_p2 plasmid, and [CP022167](#) for the pM160133_p3 plasmid. These sequences are part of BioProject no. SAMN07273977.

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