P1050
Poster Session IV
Molecular epidemiology of MDR Enterobacteriaceae

CHARACTERIZATION OF ESCHERICHIA COLI CARRYING BLANDM-7 FROM THE SULTANATE OF OMAN

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Objectives: The aim of this study was to characterize a carbapenem resistant E. coli (OM26) isolated in 2012 from the endotracheal secretion of a 67-year-old Rwandan male, permanent resident of Oman, with pneumonia and underlying hepatocellular carcinoma. The patient was previously hospitalised in Oman.
Methods: Species identification and antibiotic susceptibility testing were performed using VITEK 2. The presence of beta-lactamase, plasmid borne aminoglycoside and quinolone resistance genes were detected by PCR and confirmed by direct sequencing of the amplicons. The isolate's virulence profile, phylogenetic and sequence type were also determined. The plasmid carrying the carbapenemase gene (pOM26) was conjugally transferred into an azide-resistant derivative of E. coli J53 and its complete nucleotide sequence was determined by the 454-Genome Sequencer FLX procedure.
Results: OM26 was a phylogenetic type A, ST4107 (CC10) strain carrying only fyuA (yersiniabactin siderophore) and traT (serum resistance) of the 33 virulence genes targeted. Of the 23 antibiotics tested it was susceptible to gentamicin, amikacin, chloramphenicol, fosfomycin, tigecycline and colistin, only. Its carbapenem resistance was attributed to blaNDM-7 and the strain also harboured the blaCTX-M-15 and a blaCMY-42 genes. The blaNDM-7 was located on an IncX3 type, 45122 bp plasmid (pOM26), which was similar to the blaNDM-1 carrying pNDM-HN380 (GenBank JX104760) and blaNDM-5 carrying pNDM_MGR194 (GenBank KF220657) IncX3 plasmids. Unlike pNDM-HN380, pOM26 did not carry blaSHV-12 neither its 3' surrounding. The missing part included an IS26, an ISCR21, the groL molecular chaperone, and the 5' end of the divalent cation tolerance protein gene, cutA1. These structures are also missing from pNDM_MGR194. However, in pOM26, in the region upstream of blaNDM-7, IS5 is inserted into ISAba125 in the opposite direction compared to pNDM-HN380 and pNDM_MGR194.
Conclusions: This is the first description of NDM-7, a new variant of the New Delhi metallo-β-lactamase, from the Arabian Peninsula produced by an E. coli belonging CC10. Earlier, NDM-7 was described from a few locations, only: in Germany a strain originating from Yemen, in France an isolate imported from Burma and in Singapore. All blaNDM-7 described so far were carried by E. coli on conjugative plasmids of 40-80 kb, which were non-typable by the original PBRT, or if tested, belonged to the IncX3. Earlier observations that this incompatibility type contributes to the spread of blaNDM-1 in the United Arab Emirates and China, and that this IncX3 carrying blaNDM-7 plasmid sequenced (pOM26) shows high similarity to the IncX3 type of plasmids carrying blaNDM-1 and blaNDM-5, confirm that IncX3 plasmids are important vehicles of NDM carbapenemase genes.