

Colistin resistance among carbapenem-resistant Enterobacteriaceae recovered in Belgium in 2014 -2015



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Introduction

- *mcr-1* plasmid-mediated resistance to colistin was reported for the first time in 2016 (Liu et al., 2016) raising the concern of its occurrence in multidrug or in extensively-resistant Enterobacteriaceae.
- Here, the frequency of colistin resistance was assessed among carbapenem-resistant *Klebsiella pneumoniae* (KP) and *Escherichia coli* (EC) isolates referred to the national reference centre in 2014 and in 2015.
- The mechanism of resistance to colistin was explored to determine the chromosomal or plasmidic origin of the resistance

Results

Klebsiella pneumoniae (KP) carbapenem non-susceptible: n=791
including 101 (12,7 %) isolates colistin R (KP-CR; MIC from 4 to >= 16 mg/L)

Seventy-four KP-CR analyzed : no plasmidic *mcr-1*

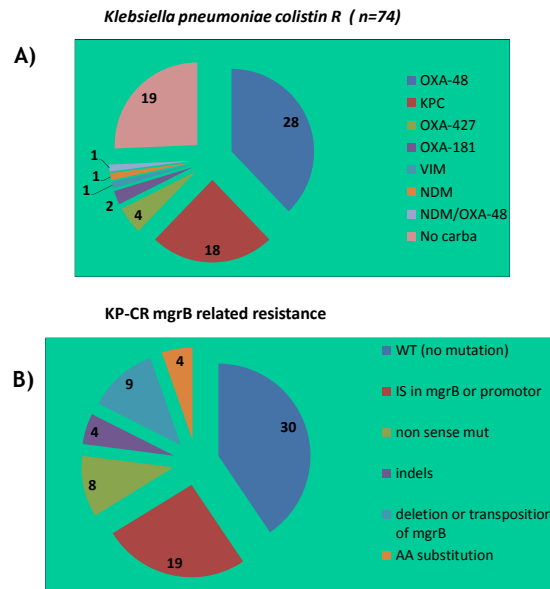


Fig. 2 A Carbapenemase type in KP-CR isolates; B mutations detected in mgrB

E. coli (EC) carbapenem non-susceptible: n=152
including 2 (1,3 %) isolates colistin R (EC-CR; MIC=4 mg/L)

Two EC-CR producing MCR-1 and OXA-48

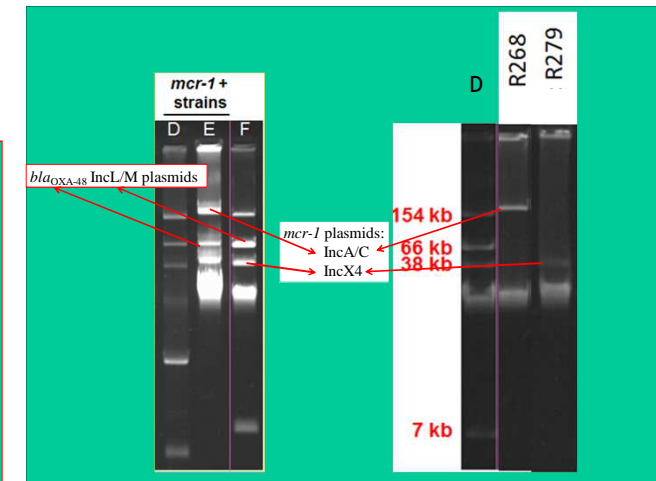


Fig. 3 Plasmid extract of *mcr-1* producing *E. coli* and colistin R transformants in *E. coli* TOP10

Colistin resistance in KP and EC raised significantly from 8 % in 2014 to 14 % in 2015 ($p=0,005$)
In particular colistin in KPC-producing KP doubled between 2014 and 2015

10/72, 14% in 2014
VS
29/87, 33 % in 2015

Probably due to the expansion of a KPC-3 producing clone (ST512)

Methods

- Inclusion criteria: all clinical KP and EC non-susceptible to carbapenems (EUCAST or CLSI criteria detected locally by Belgian laboratories from Jan. 2014 to Dec. 2015 and sent for confirmation to the NRC (CHU UCL Namur, Yvoir, Belgium).
- MIC determination against colistin and carbapenems (meropenem, ertapenem and imipenem) was performed by broth microdilution (Sensititre panels, Thermofisher) and susceptibility categorized using EUCAST criteria.
- Carbapenemase encoding genes (Bogaerts et al. 2013), *mcr-1* plasmidic gene (Liu et al., 2016) and the *mgrB* gene (Cannatelli et al., 2014) involved in chromosomal resistance to colistin were sought by PCR/sequencing. multiplex PCR targeting the carbapenemase encoding genes *bla_{VIM}*, *IMP*, *KPC*, *NDM*, and *bla_{OXA-48-like}*.
- *mcr-1* gene were confirmed by LAMP technology using Amplex Diagnostics GMBH detection kit
- *mcr-1* plasmid was transferred by electroporation in *E. coli* Top10

Conclusions

- Colistin resistance was found in 13% of carba non-susceptible KP and in 1 % of carba non-susceptible EC received in 2014 and 2015
- Colistin resistance in KP was not related to *mcr-1* but to various modifications of mgrB or other chromosomal mutations under investigation (pmrAB/PhoP/PhoQ)
- Colistin resistance was found in 2 unrelated *E. coli* isolates expressing OXA-48
- Plasmids were sequenced (Ceyssens et al. Poster P0700)

References

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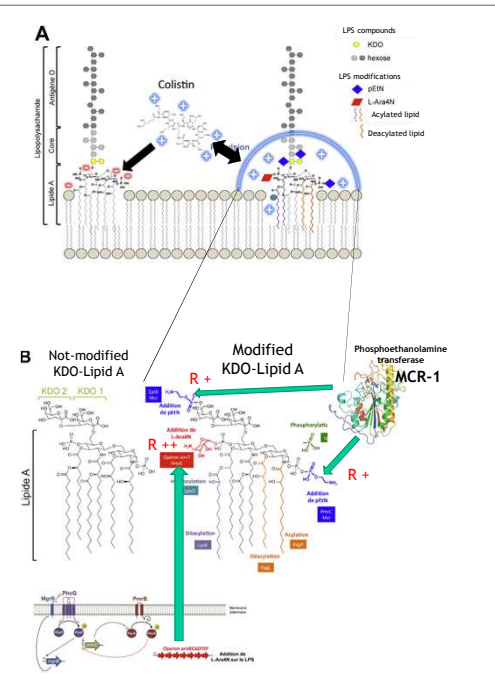


Fig. 1 Colistin resistance mechanisms from Dortet et al. 2016