Detection of OXA-23 and OXA-58 in *Proteus mirabilis* by immunochromatographic assays

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Detecting the concealed carbapenemase reservoir in *Proteus spp.*

Proteus mirabilis is a common cause of urinary tract and bloodstream infections [1]. It has been increasingly reported as a carrier of the carbapenemases OXA-23 and OXA-58, which are not typically found in Enterobacterales [2]. Due to the low meropenem and ertapenem MICs in carbapenemase-producing *Proteus*, EUCAST and CLSI clinical breakpoints, these isolates are typically described as susceptible, making sophisticated algorithms for proper recognition necessary [3]. We analyzed the use of RESIST ACINETO and RESIST-5 O.K.N.V.I lateral flow test (CORIS BioConcept) for rapid detection of the whole spectrum of carbapenemases in *Proteus* spp. and compared its performance to that of a previously described algorithm.

Study design and workflow

90 clinical *P. mirabilis* isolates collected from 2015- 2023

University Hospitals of Cologne, Oldenburg, Frankfurt and German National Reference Center for Multidrug-Resistant Gram-Negative Bacteria, Bochum

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Initial carbapenemase screening

PCR of carbapenemase gene
modified zinc-supplemented carbapenem inactivation method (mzCIM) assay
and/or
carbapenemase detection algorithm [3]

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Whole genome sequencing + Bioinformatic analysis

determination of phylogenetic relatedness
sequence type (ST) with PubMLST

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Immunochromatographic (ICT) lateral flow tests

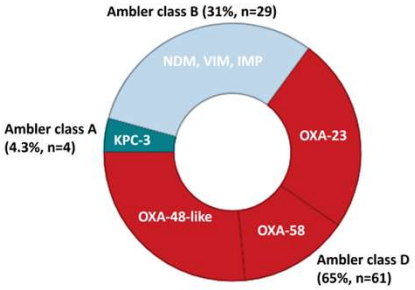
- RESIST-5 O.K.N.V.I. (detects OXA-48, KPC, NDM, VIM, and IMP in Enterobacterales)
- RESIST ACINETO (detects OXA-23, OXA-58/40 and NDM in *Acinetobacter* spp.)

Analysis of *Proteus* spp. isolates by ICT

90 Clinical *P. mirabilis* Isolates

95 Confirmed Carbapenemases

ST142 major OXA-23 producer



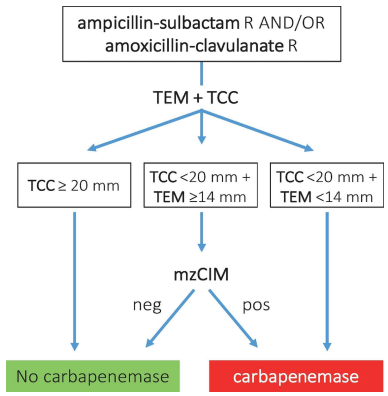
Published carbapenemase detection algorithm
classified 88/90 isolates correctly (97.8% sensitivity)

RESIST-5 assay
classified 53/55 isolates correctly (96.4% sensitivity)
0 false-positive (100% specificity)

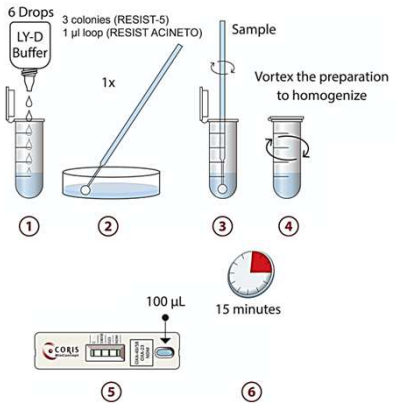
RESIST ACINETO
classified 52/54 isolates correctly (96.3% sensitivity)
1 false-positive and 2 false-negative (97.2% specificity)

Combined ICT assays
classified 88/90 isolates correctly (97.8% sensitivity)
2 false-positive and 2 false-negative

Published carbapenemase detection algorithm [3]



Lateral flow test (CORIS BioConcept, Gembloux, Belgium)

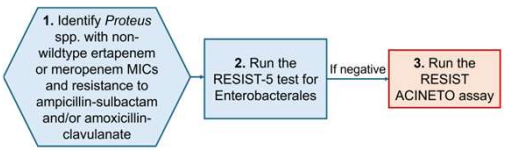


https://www.corisbio.com/products/resist-acineto

Conclusion

- The RESIST ACINETO and RESIST-5 perform well in detecting carbapenemases in *P. mirabilis,* including the challenging OXA-23 and OXA-58 carbapenemases
- These lateral flow tests have the potential to improve carbapenemase detection in the routine diagnostic laboratory for *Proteus* species

Recommended use:



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