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PA-03 Diagnostic rapide, moléculaire - Résistances aux antibiotiques

Comparison of three lateral flow immunochromatographic assays for the rapid detection of KPC, NDM, IMP, VIM and OXA-48 carbapenemases in Enterobacterales

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Introduction

The early detection of carbapenemase producing Entrobacterales (CPE) as well as the rapid discrimination of the carbapenemase type is a key point to implement hygiene control measures and to quickly adapt the treatment in case of infection. Among available tests, lateral-flow immunochromatography assay (LFIA) offers numerous advantages including their easy-handle, their relative low-cost and their rapidity (15 min).

Objectives

Compare the performances of 3 commercially available LFIAs able to detect the "big five" carbapenemases (KPC, OXA-48-like, NDM, VIM and IMP).

Methods

LFIA tests :

1) **NG-test CARBA5** (NG-Biotech, Guipry-Messac, France)
2) **RESIST-5 K.O.N.V.I** (Coris-Bioconcept, Gembloux, Belgium)
3) **CP-5** (ERA-Bio, Pittsford, US)

All tests were performed the same day from same bacterial culture.

Tested strains:

74 carbapenem-resistant Enterobacterales isolates were tested including 64 CPE (10 VIM, 17 OXA-48, 10 KPC, 10 NDM-like; 8 IMP; 5 multiple carbapenemases producers and 4 minor Class A carbapenemases producers) and 10 non-CPE.

Results

Manufacturer	NG Bio-Tech	Coris	ERA-Bio
Test	NG Carba5	RESIST K.O.N.V.I	CP-5
Number of tested strains	74	74	74
VN True negatives	13	14	12
VP True positives	59	56	53
FN False negatives	0	3	6
FP False positives	2	1	3
Sensitivity	100% (CI95 = 92,4%-100%)	94.9% (CI95 =84.9%-98.7%)	89.8% (CI95 = 78.5%-95.8%)
Specificity	86.7% (CI95 = 58.4%-97.7%)	93.3% (CI95 = 66.0%-99.7%)	80.0% (CI95 = 51.4%-94.7%)
Low intensity bands (n) on positive tests	0	1 low intensity on 10 VIM 3 low intensity on 7 IMP	1 low intensity on 10 KPC

Coris-BioConcept adapted its protocol to improve the performances and the usability of the RESIST-5 K.O.N.V.I.

46 CPE and 9 CRE non CPE were tested in parallel with the new and former protocols of RESIST-5 K.O.N.V.I and NG-Carba5 as comparator.

Regarding NDM producers, the novel version RESIST-5 K.O.N.V.I was able to detect 9/10 of the tested isolates whereas only 6/10 were detected with the former version of the test. The performances of the novel version of the RESIST-5 K.O.N.V.I were significantly improved for VIM and IMP producers. All (8/8) VIM producers and 10/11 IMP producers were accurately detected. Noticeably, with the new version of the RESIST-5 K.O.N.V.I band intensities were improved.

Conclusions

1) **The performances of the CP-5 (ERA-Bio, Pittsford, US) were not acceptable for the accurate detection of CPE.**
2) **The last version of the RESIST-5 K.O.N.V.I (Coris-Bioconc) and the NG-test CARBA5 (NG-Biotech) possess adequate performances for the early detection of CPE.**
3) **Since some IMP variants remained undetected with the novel version of the RESIST-5 K.O.N.V.I, a more specific evaluation has to be performed on other IMP variants, that are mostly encountered in *Pseudomonas* and *Acinetobacter***
4) **CP-5 and RESIST-5 K.O.N.V.I require two different detection cassettes (compare to only one for NG-Carba5) which is ecologically irrelevant in an era where carbon footprint should be reduced.**