

# Colorimetric test for the detection of Carbapenemases in Gram-negative bacilli: Which test to choose?

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## Introduction and objectives

- Detection of carbapenemases (CP) in Gram-negative bacilli (GNB) is challenging.
- Modified Hodge is inaccurate, time-consuming and difficult to interpret
- Molecular methods & MALDI-TOF MS require trained personnel and expensive infrastructure
- Chromogenic screening tests:
  - based on the hydrolysis of carbapenems
  - short hands-on-time (HOT) and turn-around-time (TAT)
  - Straightforward to perform
- 3 commercially available colorimetric screening tests for the detection of CP in GNB were evaluated.



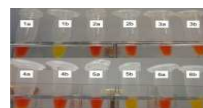
RAPIDEC CARBA NP  
BioMérieux, NP



## Methods

- 12 strains from External Quality Control (EQC) programs, all CP positive:
  - 8 *Enterobacteriaceae* (4X VIM, 3X OXA-48, 1X VIM)
  - 3 *Acinetobacter baumannii* (2x GES-12; 1X OXA-23)
  - 1 *Pseudomonas aeruginosa* (IMP)
- 57 clinical isolates, CP confirmed by the national reference laboratory:
  - 39 *Enterobacteriaceae* (12X negative, 11X OXA-48, 7X VIM, 6X KPC, 3X NDM)
  - 3 *A. baumannii* (2X OXA-23, 1X OXA-51+GES)
  - 15 *P. aeruginosa* (7X negative, 7X VIM, 1X GES)

$\beta$ -CARBA test  
Bio-Rad,  $\beta$



Neo-Rapid CARB Rosco, NEO

## Results

### RAPIDEC CARBA NP test

- Inconclusive considered positive:
  - Sensitivity 98%
  - 1 false negative OXA-23 *A. baumannii*
  - Specificity 84%
  - 3 false positive CPE negative *Enterobacter* species
- Inconclusive considered negative:
  - Sensitivity 88%
  - 1 false negative OXA-51+GES, 3 OXA-23, 1 GES-12 *A. baumannii*
  - 1 false negative GES *P. aeruginosa*
  - Specificity 95%
  - 1 false positive CPE negative *Enterobacter* species

Table 1: Results NP-test

|                   | Positive  | Negative  | inconclusive |
|-------------------|-----------|-----------|--------------|
| EQC strains       | 10        | 1         | 1            |
| Clinical isolates | 35        | 16        | 6            |
| <b>Total</b>      | <b>45</b> | <b>17</b> | <b>7</b>     |

Table 2: Results NEO-test

|                   | Positive  | Negative  | inconclusive |
|-------------------|-----------|-----------|--------------|
| EQC strains       | 12        | 0         | 0            |
| Clinical isolates | 37        | 20        | 0            |
| <b>Total</b>      | <b>49</b> | <b>20</b> | <b>0</b>     |

### NEO-RAPID CARB test

- No inconclusive results
- Sensitivity 98%
- 1 false negative GES *P. aeruginosa*
- Specificity 100%

Table 1: Results  $\beta$ -test

|                   | Positive  | Negative  | inconclusive |
|-------------------|-----------|-----------|--------------|
| EQC strains       | 8         | 0         | 0            |
| Clinical isolates | 25        | 14        | 0            |
| <b>Total</b>      | <b>33</b> | <b>14</b> | <b>0</b>     |

### $\beta$ -CARBA test

- Only for *Enterobacteriaceae* (n= 47)
- Sensitivity 94%
- 1 false negative OXA-48 *E. kobei/asburiae*
- 1 false negative VIM *E. cloacae*
- Specificity 100%

The screening tests: are easy to use and suitable for a fast and reliable detection of CP in GNB  
have a TAT of one day shorter as compared to the modified Hodge test.

The NEO-test's analytical performance in this evaluation is superior to the NP test and can be used for non-*Enterobacteriaceae* as well.