

## INTRODUCTION AND PURPOSE

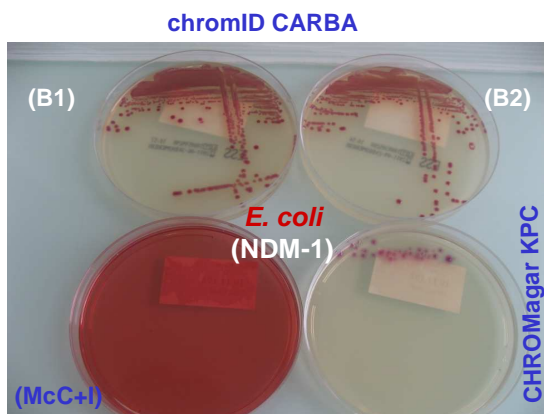
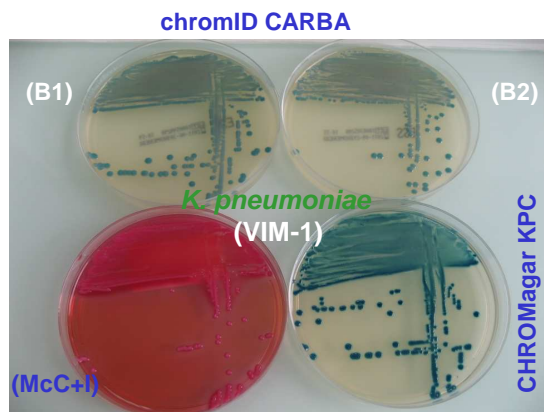
Carbapenemase Producing *Enterobacteriaceae* (CPE) are multi-resistant emerging bacteria which can be responsible for hospital acquired infections and outbreaks. Detection of CPE carriers is of particular importance for prevention and epidemiological monitoring of these infections. In this context, chromogenic media for CPE should make screening easier due to their selectivity and the use of different colours to discriminate targeted species. The aim of this study was to evaluate the performance of two chromogenic media for CPE detection, namely **chromID™ CARBA** (a prototype medium from bioMérieux based on the same principles than the ones – ID Carba – previously tested by Perry *et al.*, 2011) and **CHROMagar™ KPC** (CHROMagar). A commonly used selective home-brewed medium, **MacConkey** supplemented with 1 mg/L **imipenem (McC+I)**, was also included in the study.

## METHODS

A total of 194 isolates was tested, including 127 CPE with different types of carbapenemases (53 KPC, 44 NDM, 13 VIM, 11 IMP, 6 OXA-48) and 67 isolates not producing a carbapenemase. All microorganisms were inoculated directly onto each medium with 10 µL of a 0.5 McFarland calibrated suspension before 24 h incubation at 34-38°C. Two batches of **chromID™ CARBA** were used: one freshly prepared (B1) and one close to the expiry date (B2).

## RESULTS

Sensitivity and specificity results for CPE detection are shown in the table below. Typical colonies of *Klebsiella pneumoniae* (coloured in green) and *Escherichia coli* (coloured in pink) are presented for each medium tested. For **chromID™ CARBA**, the sensitivity for CPE detection varied from 89.8% (B1) to 96.1% (B2). By comparison, the sensitivity was 89.0% for **CHROMagar™ KPC** and only 68.5% for **McC+I**. Variation in sensitivity was dependent on the types of carbapenemases. For KPC, NDM and VIM the sensitivity of detection by the two batches of **chromID™ CARBA** was similar and usually higher when compared to **CHROMagar™ KPC** and **McC+I**. However, detection of IMP and OXA-48 could be more difficult with a fresh medium than with a medium close to the expiry date. Nonetheless, the specificity of **chromID™ CARBA** (B2) remained stable over time.



Type	Total	Microorganism (nb of strain)	chromID Carba (B1)	chromID Carba (B2)	CHROMagar KPC	MacConkey (McC+I)
Class A KPC	53	<i>E. coli</i> (6)	96.2%	100%	96.2%	56.6%
		<i>Klebsiella</i> (43)				
		<i>Enterobacter</i> (4)				
Class B NDM	44	<i>E. coli</i> (31)	97.7%	97.7%	90.9%	77.8%
		<i>Klebsiella</i> (5)				
		<i>Enterobacter</i> (7)				
		<i>Citrobacter</i> * (1)				
Class B VIM	13	<i>E. coli</i> (5)	84.6%	92.3%	61.5%	69.2%
		<i>Klebsiella</i> (2)				
		<i>Enterobacter</i> (5)				
Class B IMP	11	<i>E. coli</i> (2)	45.5%	72.7%	81.8%	81.8%
		<i>Klebsiella</i> (1)				
		<i>Enterobacter</i> ** (7)				
		<i>Serratia</i> (1)				
Class D OXA-48	6	<i>E. coli</i> (1)	66.7%	100%	83.3%	83.3%
		<i>Klebsiella</i> (5)				

## Sensitivity

(True positive / (True positive + false negative) x 100

## Specificity

(True negative / (True negative + false positive) x 100

\* A strain of *Citrobacter freundii* expressing both β-galactosidase and β-glucosidase produce violet colonies on **chromID™ CARBA** and a mixture of pink and blue colonies on **CHROMagar™ KPC**.

\*\* 3 of 7 strains of IMP producing *Enterobacter* that grow on **chromID™ CARBA** produced violet colonies associated to positivity of both β-glucuronidase and β-glucosidase activities.

## CONCLUSION

This study highlights the superior sensitivity of both chromogenic media over the **imipenem supplemented MacConkey**. In comparison to **CHROMagar™ KPC**, **chromID™ CARBA** presents three advantages:

- (i) trend to higher sensitivity,
- (ii) ready to use plates and
- (iii) extended shelf life.

As such, it has the potential of being a very useful tool for the screening of patients who carry the widespread KPC- and NDM-producing *Enterobacteriaceae*. These results should be confirmed with clinical samples such as rectal swabs.