Evaluation of a new commercial medium, the chromagar msupercarba, for the detection of carbapenemase-producing *Enterobacteriaceae*

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Background

In Israel, the carbapenemase-producing *Enterobacteriaceae* (CPE) epidemic was initially caused by KPC-producing *K. pneumoniae*. In recent years, new types of CPE, including NDM- and OXA-48-producing *Enterobacteriaceae*, have disseminated in Israel.

Thus, surveillance media such as the CHROMAgar™-KPC (KPC) or MacConkey with Imipenem (1 mg/L) (MAC/IMI) that are widely used in Israel might be inadequate to cope with these new challenges.

The objective of this study was to evaluate the performance of a new commercial media, the CHROMAgar™ mSuperCARBA™ (SUPERCARBA), for the detection of variety of CPE strains.
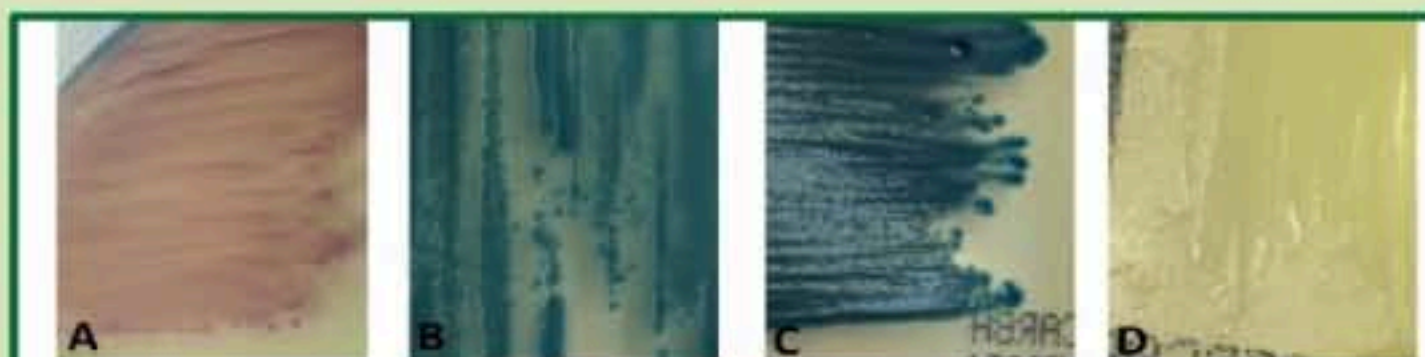
Figure 1: Colony appearance of various carbapenem-resistant gram (-) rods grown on SUPERCARBA agar : **A.** CPE *E. Coli* (KPC) **B.** CPE *K. pneumoniae* (NDM) **C.** *E. aerogenes* (OXA-48) **D.** Carbapenem-resistant *P. aeruginosa*

Material & Methods

The study examined the in-vitro performance for the detection of CPE of three media:

1) KPC 2) MAC/IMI 3) SUPERCARBA (figure 1)

The study used a collection of 98 carbapenem-resistant *Enterobacteriaceae* (CRE) strains, that included 69 CPE's of various genes(Table 1) .

The sensitivity and 29 non-carbapenemase-producing (NCP) CRE's (was calculated as:

1) the growth of CPE's at the 10^1 inoculum

2) sensitivity score (growth at $10^1, 10^2$ and 10^3 credited 2, 1 and 0.5 points, respectively)

3) sensitivity adjusted to the actual prevalence of each of the CPE types at our hospital (KPC-58%, OXA-48-25%, NDM-16%, VIM-1%) [Σ(CPE gene-specific sensitivity X institutional prevalence of that gene)]

The specificity was calculated based on the growth of NCP-CRE.

Table 1

	Total		Detection at ~10^1 cfu			Detection score		
	Isolates (n)	Score (max.)	MAC/IMI	SUPERC ARBA	KPC	MAC/IMI	SUPERC ARBA	KPC
KPC	11	22	8	9	9	16	19	19
NDM	17	34	13	12	11	28.5	26.5	24.5
OXA-48	19	38	5	14	6	15	32	13
VIM	15	30	14	14	10	28	28.5	21
IMI	5	10	5	3	4	10	6	9
CPE, total	67	134	45	52	40	97.5	112	86.5
NCP- CRE	29	58	14	15	18	32	32.5	37

Results

The sensitivity and specificity of the three media in detecting CPE's vs. NCP-CRE are presented in the Table 2. The SUPERCARBA was the most sensitive media by all parameters, especially in detecting OXA-48 CPE. The MAC/IMI media was the second most sensitive by the non-adjusted measures but scored below the KPC media by the prevalence-adjusted measure. The MAC/IMI media was slightly more specific compared with the SUPERCARBA media. All three media were able to efficiently differentiate CRE from non-CRE organisms.

Table 2

	Detection at ~10^1 cfu			Detection score		
	MAC/IMI	SUPER CARBA	KPC	MAC/IMI	SUPERCA RBA	KPC
Sensitivity (%)	67	78	60	73	83	64
95% C.I.	55-77	66-86	48-70	65-80	76-89	56-72
Adjusted sensitivity	62	78	66	66	84	70
Specificity (%)	52	48	38	45	44	36

Conclusions

The CHROMAgar™ mSuperCARBA™ media is superior to commonly used surveillance media in detecting non-KPC CPE's that are becoming more prevalent in Israel.