



# DETECTION OF EXTENDED-SPECTRUM $\beta$ -LACTAMASE PRODUCING ENTEROBACTERIACEAE



## BY CHROMOGENIC ESBL SELECTIVE MEDIUM

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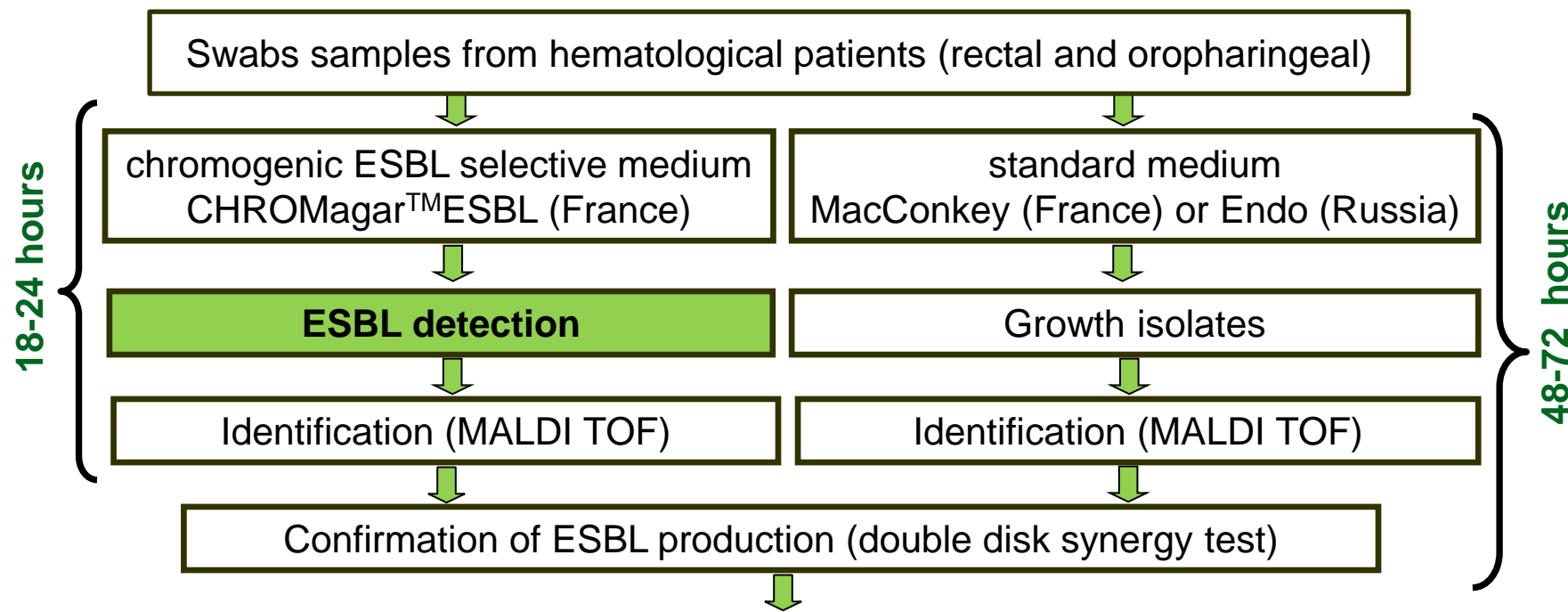
### OBJECTIVES

The aim of the study was to evaluate the detection of extended-spectrum beta-lactamase producing *Enterobacteriaceae* (ESBL-E) by chromogenic ESBL selective medium and to compare results with double disk synergy test.

### METHOD

Prospective study was performed from April 2013 to December 2013.

Study design was as follows:



#### Additional tests

- AmpC detection  
Strains sensitive to Cefepime and resistant to Cefoxitin → E-test (Cefotetan and Cefotetan with Cloxacillin)
- Detection of TEM-1 and CTX-M by real-time PCR

### RESULTS

We collected 1552 swabs and 1243 *Enterobacteriaceae* isolates were obtained. A total of 394 ESBL-E strains were recovered (Fig. 2), of those 123 (31%) only on chromogenic ESBL selective medium, 263 (67%) on standard medium and on CHROMagar™ESBL, 8 (2%) only on standard medium ( $p < 0,0001$ , Fig. 1). Characteristics of ESBL-E are summarized in Table 1. CTX-M group of ESBL were detected in the majority of ESBL-E.

Production of ESBL was confirmed for 94% (386/409) isolates obtained on chromogenic ESBL selective, other 6% (23/409) isolates were non-ESBL-E (Tab. 2). Sensitivity and specificity of CHROMagar™ESBL was 98% and 97%, respectively (Tab. 3).

### CONCLUSION

Chromogenic ESBL selective medium had high sensitivity (98%) and specificity (97%) for the detection of ESBL-E and might be used in routine laboratory practice. Detection of ESBL-E from the same rectal swabs by chromogenic ESBL selective medium was significantly higher than by standard medium (98% vs. 69%,  $p < 0,0001$ ) and data were reported to clinical department in 18-24 hours.

### RESULTS

Fig. 1. ESBL-E detection

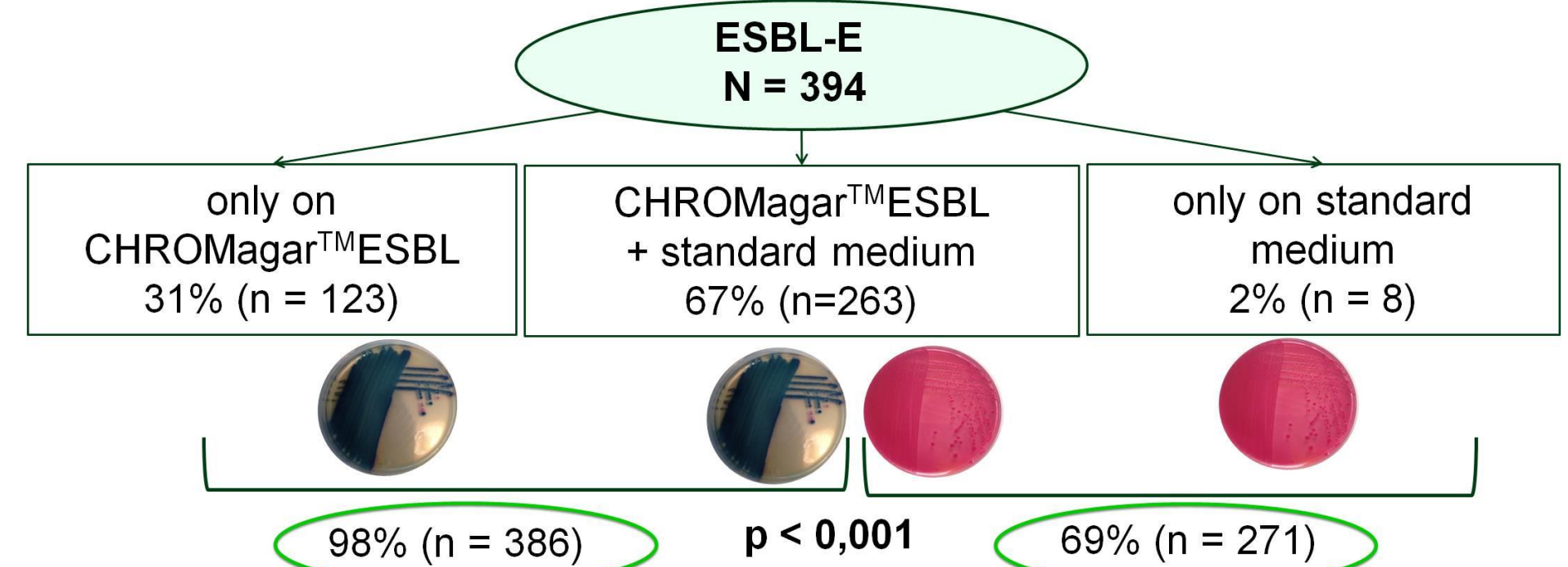


Fig. 2. Distribution of ESBL-E (N = 394)

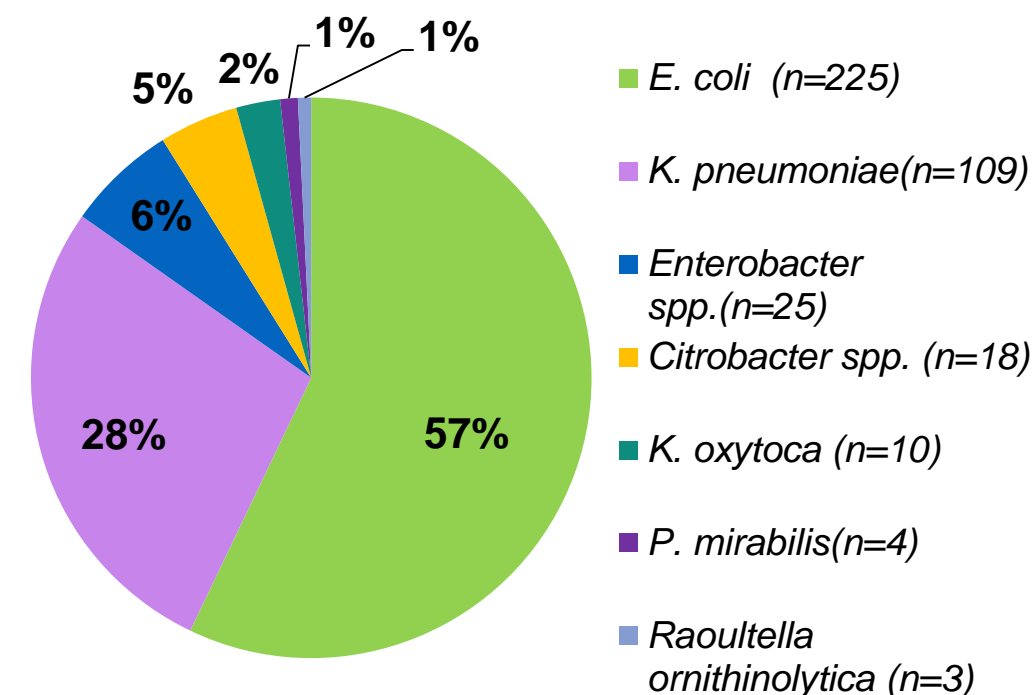


Table 1. Characteristics of ESBL-E

ESBL-E	CTX-M, n (%)	TEM, n (%)	TEM+ CTX-M, n (%)
<i>E. coli</i>	157 (70)	107 (48)	64 (28)
<i>K. pneumoniae</i>	51 (47)	36 (33)	10 (9)
<i>Enterobacter</i> spp.	20 (80)	10 (40)	7 (28)
<i>Citrobacter</i> spp.	14 (78)	8 (44)	7 (39)
<i>K. oxytoca</i>	7 (70)	3 (30)	2 (20)
<i>P. mirabilis</i>	1 (25)	4 (100)	1 (25)
<i>Raoultella ornithinolytica</i>	2 (67)	1 (33)	1 (33)
<b>Total</b>	<b>252 (64)</b>	<b>169 (43)</b>	<b>92 (23)</b>

Table 2. False positive detection of ESBL on CHROMagar™ESBL (n=23)

Strains (N)	Species	n (%)
ampC (+) strains (N=15)	<i>Enterobacter</i> spp.	11 (73)
	<i>Citrobacter</i> spp.	2 (13)
	<i>M. morgani</i>	1 (7)
	<i>E. coli</i>	1 (7)
Strains sensitive to cephalosporins (N=8)	<i>E. coli</i>	3 (37,5)
	<i>K. oxytoca</i>	2 (25)
	<i>P. vulgaris</i>	2 (25)
	<i>Citrobacter</i> spp.	1 (12,5)

Table 3. Sensitivity and specificity of CHROMagar™ESBL medium

Species of ESBL-E	Sensitivity	Specificity
<i>E. coli</i>	99%	99%
<i>K. pneumoniae</i>	96%	100%
Other <i>Enterobacteriaceae</i>	98%	95%
<b>Total</b>	<b>98%</b>	<b>97%</b>

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