

# Evaluation of a highly selective chromogenic medium to screen for OXA-type carbapenemase-positive Enterobacteriaceae

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## Introduction

Rapid identification of multi-drug resistant (MDR) organisms, and their MDR-phenotypes is crucial to accurate therapy regimens against infection. Plasmid-mediated carbapenem-hydrolysing oxacillinases, such as OXA-48, are now globally disseminated through their recruitment within a wide range of Gram-negative species, including the Enterobacteriaceae. This work aims to evaluate the efficacy of a selective Chromatic OXA agar (Liofilchem®). Selection works on the premise of inhibiting all other carbapenemase-producers, thus using viable growth as an indicator for identification of OXA carbapenemase-positive Gram-negative bacteria. These plates can play a role in the screening of clinical faecal samples, where speed of diagnosis is vital, and also in detection during outbreak scenarios and so efficacy testing against contemporary, clinical MDR organisms is a valuable endeavour.

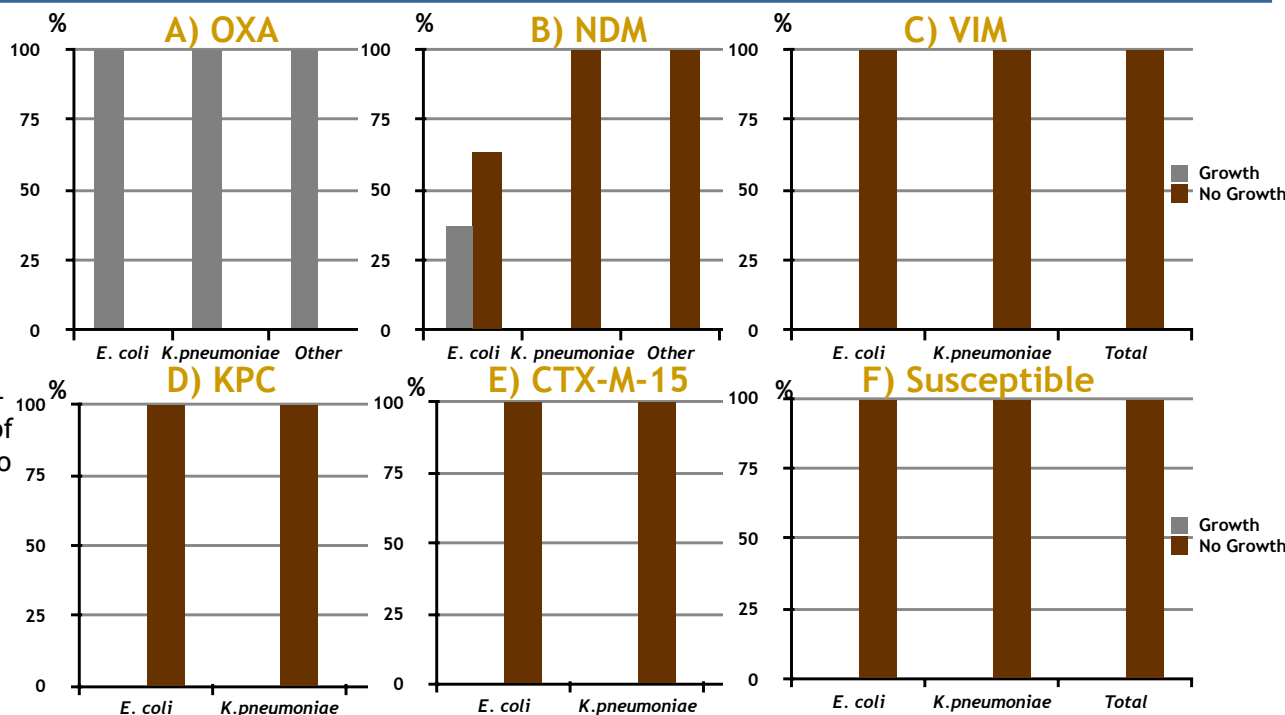
## Methods

**Test Sample:** A total of 232 Gram-negative bacteria were tested, consisting of *E. coli* & *K. pneumoniae*, and where unspecified ('Other'), species including other Enterobacteriaceae such as *Enterobacter spp.*, and *K. oxytoca*. The sample consisted of six different genotypes; OXA-positive (n=53), and the comparator groups of NDM-positive (n=52), VIM-positive (n=29), KPC-positive (n=54), CTX-M-15-positive (n=21), susceptible (n=23). **Protocol:** Approximately  $1.5 \times 10^8$  cfu/ml (0.5McF) were uniformly streaked onto OXA-Selection plates, and incubated for 12-18hrs at 37°C. OXA-production indicated where viable growth was observed.

## Results

Results can be seen summarised for each of the genotypic test categories in **Figures A-F**, where the percentage of each species showing growth/no growth is plotted.

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Measured against expected results, overall accuracy of the OXA-selective chromogenic agar is 97%. This increases to 100% for *K. pneumoniae* specifically, with 87.3% for *E. coli*. Sensitivity for detection of OXA-producers was 100% (**Fig. A**), and these included *E. coli*, *K. pneumoniae*, *K. oxytoca*, and *E. cloacae*. N=7 NDM-producing *E. coli* gave false-positive results, confirmed by negative results by OXA-PCR assay. Specificity against VIM-, KPC- and CTX-M-15-producers, and sensitive Enterobacteriaceae, was also 100%. The chromogenic indicator of the agar was accurate for both *E. coli* and *K. pneumoniae* growth.

## Conclusions

Sensitivity rates for the detection of OXA-type carbapenemase producing Enterobacteriaceae was 100%, however, specificity rates were 97% due to a number of NDM-1-producing *E. coli*. These plates can supplement other carbapenemase screening plates & confirmatory methods to improve detection of these important organisms in hospital settings.