Evaluation of chromID®CARBA and chromID®OXA-48 media for the detection of carbapenemase-producing Acinetobacter spp.

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Introduction and Purpose

Carbapenem resistant Acinetobacter are responsible for serious nosocomial infections and their detection is important for the prevention and epidemiological monitoring of these infections. In this context, the use of a selective chromogenic agar contributes to the active surveillance of carbapenem resistant bacteria. chromID®CARBA and chromID®OXA-48 are two chromogenic media designed for the screening of carbapenemase producing enterobacteria. The main mechanism of carbapenem-resistance in Acinetobacter spp. is mediated through overexpression of weak carbapenemases belonging to the OXA-subclass. The aim of this study was to evaluate the ability of these media to detect carbapenem resistant Acinetobacter spp.

Methods

- The following isolates were included in the study:
  - 104 carbapenem non-susceptible Acinetobacter baumannii mediated though the following carbapenemases; OXA (N=100), NDM-1 (N=2), NDM-2 (N=1) or VIM-2 (Table 1).
  - 12 Acinetobacter spp. isolates comprising A. pittii (n=6, OXA-23), OXA-58, OXA-23, A. radioresistens (n=2, OXA-23), A. berezinae (n=1, OXA-257) and Acinetobacter genomic species 14TU/13BJ (n=1, OXA-23) (Table 2).
  - In addition, the carbapenem susceptible A. baumannii ATCC17978 transformed with plasmids harbouring 11 OXA-type carbapenemases was included.

  - As controls, 5 carbapenem-susceptible isolates that were positive for carbapenemase genes (OXA-58-like, OXA-143-like, GIM-1 or overexpression OXA-51-like) and 2 isolates with no resistance determinants were included.

  - Approximately 1000 CFU's were plated on chromID®CARBA and chromID®OXA-48 and incubated overnight at 37°C.

  - Carbapenem-resistance was confirmed in parallel using imipenem and meropenem discs and interpreted using CLSI guidelines.

Results

Results are summarized in Tables 1-3. All isolates that grew on either of the selective media were colourless (Fig 1). Almost all the carbapenem non-susceptible isolates with an acquired carbapenemase grew on chromID®CARBA plates. Fewer isolates grew on chromID®OXA-48. The A. baumannii results are summarized in Table 1. 95% of them grew on chromID®CARBA. A carbapenem-susceptible isolate (A. baumannii) grew on both media. Table 2 summarizes growth of Acinetobacter spp. on the selective media. None of the susceptible A. pittii grew on the selective plates. To remove strain-specific differences, we tested growth of A. baumannii ATCC17978 transformed with different blaOXA (Table 3). All carbapenem-resistant isolates grew on both plates with the exception of the OXA-109 transformant.

Conclusions

These data show that a high proportion of carbapenem-resistant Acinetobacter spp. grew on the chromID®CARBA selective medium. This medium has high sensitivity to OXA-23-like, OXA-40-like, OXA-58, OXA-143-like and NDM positive isolates. chromID®CARBA medium is least sensitive for isolates with resistance mediated through OXA-235-like or overexpression of OXA-51-like, and may reflect the relative enzymatic weakness of these carbapenemases. However, the specificity was high, with only one carbapenem-susceptible isolate growing on chromID®CARBA and chromID®OXA-48 media. Nearly all OXA-58-like and OXA-235-like isolates grew on chromID®OXA-48 medium. The use of both these media therefore has the potential to aid in the screening of carbapenem-resistant Acinetobacter spp.