CHROMAgar Acinetobacter media for detection of multidrug resistant (MDR) Acinetobacter in surveillance cultures

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Abstract

MDR-*Acinetobacter baumanii* (MDR-Acin) has emerged as an important nosocomial pathogen. Sensitive culture techniques are needed to identify patients colonized/infected with MDR-Acin so appropriate epidemiological precautions can be taken to prevent the spread of the organism to other patients. Currently there are no recommended media for the isolation of this organism from surveillance cultures. We investigated the utility of a newly developed MDR-Acin isolation media, CHROMAgar Acinetobacter (CA-Acin) (CHROMagar, Paris, FR) compared to BHI Broths with 16 µg/ml Imipenem to detect MDR-Acin. Surface swabs (n=258) and respiratory specimens (n=257) were obtained from hospital inpatients between July and November 2008 and inoculated into BHI-Imipenem or CA-Acin. BHI-Imipenem broths that were turbid after 24 hours were subcultured to MacConkey agar and evaluated for the presence of *Acinetobacter.* The CA-Acin plates were screened for *Acinetobacter* by evaluating the plates for teal colonies growing at 24 hours. The identity of teal colonies was determined using TSI slant and the Vitek2. Colonies identified as *Acinetobacter* were determined to be multi-drug resistant using disk diffusion susceptibility. Of 31 MDR-A cin isolates identified using BHI-Imipenem, 30 were isolated using the CA-Acin media. Non-MDR Acinetobacter was identified in 15 cultures using the CA-Acin media and 1 culture using the broth method. *P. aeruginosa* and *S. maltophilia* also yield teal colonies using CA-Acin media which can be distinguished by the oxidase reaction and colony morphology, respectively. This study demonstrates that CA-Acin media has a sensitivity of 96.8% and specificity of 88.9%. When the entire identification algorithm is employed, CA-Acin had an accuracy of 99.8% when compared to the broth method for recovery of MDR-Acin in our laboratory. The use of this medium will lead to improved infection control through quick and accurate detection of MDR-Acin in the inpatient setting.

Background

Nosocomial outbreaks caused by Multi-Drug Resistant *Acinetobacter* is a growing concern among hospital infection control practitioners. *Acinetobacter* can be a component of normal human skin flora and can survive on dry inanimate surfaces for up to 5 months. A wide array of intrinsic and acquired resistance mechanisms have been described for *Acinetobacter*. There are several species of the genus *Acinetobacter*, however *Acinetobacter baumanii* is thought to be the main culprit in MDR-infections. *Acinetobacter* is a major cause of morbidity and mortality in hospitalized patients. The most common presentations nosocomial infections caused by *Acinetobacter* are pneumonia, bloodstream infection and skin/soft tissue infections. Rapid identification of patients that are colonized with *Acinetobacter* would lead to infection control practices aimed at preventing spread of the organisms. However, there is not currently effective media for screening cultures specific for *Acinetobacter*. Here, we analyze the ability of chromogenic media for the detection of *Acinetobacter* in screening cultures from ICU patients.

Methods

BHI-Imipenem Broth vs. CHROMAgar Acinetobacter Media

Surface swabs and respiratory specimens were obtained from hospital inpatients between July and November 2008 and inoculated into BHI-Imipenem or CA-Acin. BHI-Imipenem broths that were turbid after 24 hours were subcultured to MacConkey agar and evaluated for the presence of *Acinetobacter*. The CA-Acin plates were screened for *Acinetobacter* by evaluating the plates for teal colonies growing at 24 hours.

CHROMAgar Acinetobacter vs. CHROMAgar Acinetobacter Red

Surface swabs and respiratory specimens were obtained from hospital inpatients between January and May 2009 and onto CA-Acin or CA-Acin Red. The CA-Acin plates were screened for *Acinetobacter* by evaluating the plates for teal or red colonies growing at 24 hours. Colorless colonies were incubated an additional 24 hours to evaluate chromogenic activity.

Acinetobacter was identified by VITEK II and antimicrobial susceptibility was determined by Kirbey-Bauer Method. Isolates defined as MDR are intermediate or resistant to ***4 or more*** of the following:

a. Beta-lactams
b. Aminoglycosides
c. Quinolones
d. Antimetabolites
1. Glycyclines

To be considered resistant to a Class, the organism must be resistant to all members of the class tested

Results

	Total Tests	Positive	All Acinetobacter	MDR Acinetobacter	Non-MDR Acinetobacter
BROTH	515	135	32	31	1
CHROMAgar	515	84	45	30	15

Table 1. Detection of MDR Acinetobacter using Imipenem Broth and CHROMAgar Acinetobacter media. Cultures were considered positive at 24 hours (Broth) or demonstrated teal colonies (CHROMAgar Acinetobacter). Confirmatory tests were performed to identify the organisms grown in these cultures.

	Sensitivity	Specificity	Accuracy
CHROMAgar	96.80%	88.90%	99.80%

Table 2. Performance of CHROMAgar Acinetobacter media compared to Imipenem-Broth culture in detecting MDR Acinetobacter

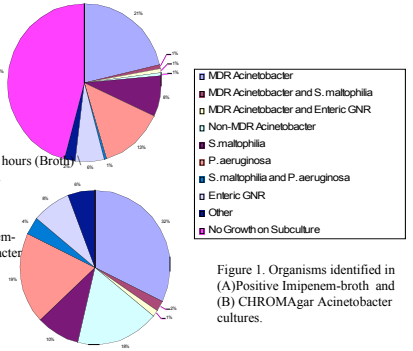


Figure 1. Organisms identified in (A)Positive Imipenem-broth and (B) CHROMAgar Acinetobacter cultures.

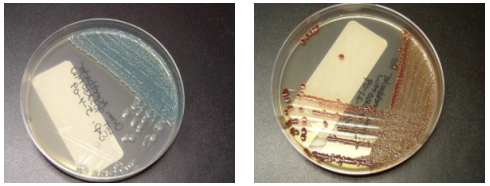
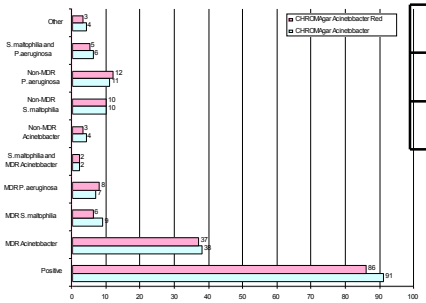


Figure 2. Appearance of MDR Acinetobacter on CHROMAgar Acinetobacter and CHROMAgar Acinetobacter Red Media



Sensitivity	94.70%
Specificity	91.60%
Accuracy	92.10%

Table 3. Performance of CHROMAgar Acinetobacter Red compared to CHROMAgar Acinetobacter media.

Figure 3. Identification of organisms Recovered using CHROMAgar Acinetobacter and CHROMAgar Acinetobacter Red media.

Summary and Conclusion

•Compared to Imipenem broth, CHROMAgar Acinetobacter media is effective in recovering MDR Acinetobacter in 24 hour cultures.

•Acinetobacter produces distinctive teal colonies on CHROMAgar Acinetobacter media. However Acinetobacter colonies resemble those produced by *S. maltophilia* and *P. aeruginosa*. These organisms must be differentiated to confirm the presence of MDR Acinetobacter.

•CHROMAgar Acinetobacter media is ieffective3 in recovering MDR Acinetobacter from screening cultures obstained from skin and respiratory sites. However, due to breakthrough of MMDR and non-MDR *P. aeruginosa* and *S. maltophilia* laboratories should perform additional testing to confirm the presence of MDR Acinetobacter

References

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