A Comparison Of Two Chromogenic Media For Detection Of Vancomycin Resistant Enterococci From South Australian Patients

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Overview

Purpose: this study was conducted to compare performance of Thermo Scientific™ Oxoid™ *Brilliance*™ VRE Agar (Thermo Fisher Scientific) and chromID™ VRE Agar (bioMérieux) for detecting vancomycin-resistant enterococci (VRE).

Methods: VRE isolates, rectal swabs and fecal samples were plated onto the two media prior to incubation, with and without broth enrichment. Quantity of growth, colony size and colony colour were recorded.

Results: *Brilliance* VRE Agar showed markedly better performance than chromID VRE Agar when samples were directly plates and comparable performance when samples where broth enriched.

Introduction

VRE were first reported in Australia in 1994[1]. The two most common species, Enterococcus faecalis and E. faecium, can harbour transmissible vanA and vanB genes, which encode resistance to vancomycin[2]. VRE are therefore significant nosocomial pathogens, and may cause serious infections, including bacteremia[3]. Because of the ability of VRE to transfer antibiotic resistance factors to other micro-organisms and the threat of clinical infections with VRE in susceptible patient groups, prevention and control measures are critical[4].

Brilliance VRE Agar (figure 1) is a chromogenic screening medium for the detection of VRE directly from clinical samples.

This evaluation was performed by a medical pathology laboratory in South Australia on behalf of Thermo Fisher Scientific (Microbiology), UK.

Methods

0.5 McFarland suspensions of 114 VRE isolates previously isolated from clinical samples were prepared using 0.9% sterile saline. A 25 µl aliquot of each suspension was streaked onto *Brilliance* VRE Agar and chromID VRE Agar.

Three hundred and seventy rectal swabs were emulsified in 0.9% sterile saline and 25 µl aliquots were streaked onto both agars.

Two hundred and twenty two faecal samples were prepared by making (approximately) 10% suspensions in 0.9% sterile saline. Twenty five microlitre aliquots were streaked onto both agars.

A portion of each remaining swab/faecal suspension was also inoculated into 10 ml Selective Enrichment VRE Broth (bioMérieux) and incubated at 35°C for up to 48 h. Twenty five microlitre aliquots were then subcultured onto *Brilliance* VRE Agar and chromID VRE Agar.

All plates were incubated at 35°C and read at 20-24 h and 48 h.

Quantity of growth, colony size and colony colour were recorded. Colonies were identified by at least Gram stain, biochemical identification and susceptibility testing. Isolates identified biochemically and phenotypically as VRE were confirmed by genotyping of vanA and vanB genes by RT-PCR.

McNemar's chi squared test was used to compare performance of the two agars. P<0.05 was considered statically significant.

Results

Of the 114 vancomycin-resistant *E. faecium* and *E. faecalis* isolates, 108 grew on *Brilliance* VRE Agar (inclusivity of 94.7%) and 105 on chromID VRE Agar (inclusivity of 92.1%) at 24 h. At 48 h, both agars showed growth of all 114 isolates (inclusivity of 100%).

Brilliance VRE Agar showed significantly higher sensitivity (P 0.0005) at 20-24 h incubation and significantly higher specificity (P<0.0001) at 48 h incubation than chromID VRE Agar from directly plated clinical samples. Although not statistically significant, *Brilliance* VRE Agar also showed consistently higher performance in detecting VRE from directly plated clinical samples at both incubation times compared to chromID VRE Agar.

Brilliance VRE Agar showed comparable sensitivity, specificity and NPV in detecting VRE from broth-enriched clinical samples at 20-24 h incubation. Sensitivity and NPV was also comparable at 48 h incubation with specificity of *Brilliance* VRE Agar being significantly higher (P<0.0001) than chromID VRE Agar.

ChromID VRE Agar showed considerably more growth of non-VRE than *Brilliance* VRE Agar at both 24 h and 48 h incubation. Growth of non-VRE on chromID VRE Agar appeared as both typical VRE colonies and atypical colonies. The majority of false positive results on chromID VRE Agar were identified as coliforms and yeasts.

TABLE 1. Performance of *Brilliance* VRE Agar and chromID VRE Agar for detection of VRE from directly plated clinical samples

Incubation time	Product	Sensitivity (%)	Specificity (%)	NPV (%)
20-24h	*Brilliance* VRE	96.2 (95% CI 97.4-97.7)	96.5 (95% CI 95.0-98.0)	99.8 (95% CI 99.5-100)
	chromID VRE	75.0 (95% CI 71.5-78.5)	94.8 (95% CI 93.0-96.6)	99.5 (95% CI 98.3-100)
48h	*Brilliance* VRE	100 (95% CI 100)	86.2 (95% CI 83.4-89)	100 (95% CI 100)
	chromID VRE	97.9 (95% CI 96.7-99.1)	67.1 (95% CI 63.3-70.9)	99.7 (95% CI 98.8-100)

TABLE 2. Performance of *Brilliance* VRE Agar and chromID VRE Agar for detection of VRE from broth-enriched clinical samples

Incubation time	Product	Sensitivity (%)	Specificity (%)	NPV (%)
20-24h	*Brilliance* VRE	97.8 (95% CI 96.6-99)	99.5 (95% CI 98.9-100)	99.8 (95% CI99.5-100)
	chromID VRE	97.8 (95% CI 96.6-99)	99.3 (95% CI 98.6-100)	99.8 (95% CI 99.5-100)
48h	*Brilliance* VRE	98.3 (95% CI 97.3-99.3)	98.5 (95% CI 97.5-99.5)	99.8 (95% CI 99.5-100)
	chromID VRE	100 (95% CI 100)	85.4 (95% CI 82.6-88.2)	100 (95% CI 100)

Conclusion

Brilliance VRE Agar showed markedly better sensitivity at 24 h than chromID VRE Agar and has proven to be a highly sensitive and specific medium for the detection of VRE from clinical samples. *Brilliance* VRE Agar produced notably fewer false positive results than chromID VRE Agar when samples were directly plated and broth-enriched, thus reducing the number of additional confirmation procedures. Reliable and accurate results were available within 24 h when using *Brilliance* VRE Agar, allowing rapid initiation of infection control measures and patient treatment.

Acknowledgements

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References

1. Grayson, M L., Grabsch, E A., Johnson, P D R., Olden, D., Aberline, M., Li, H Y., Hogg, G., Abbott, M. and Kerr, P G. (1999).Outcome of a screening program for vancomycin-resistant enterococci in a hospital in Victoria. MJA. 171: 133-136.
2. Tenover F C, McDonald L C. (2005). Vancomycin-resistant staphylococci and Enterococci: epidemiology and control. *Curr Opin Infect Dis*. 18: 300-305
3. Grabsch, E A., Ghaly-Derias, S., Gao, W., and Howden, B P. (2008) Comparative Study of Selective Chromogenic (chromID VRE) and Bile Esculin Agars for Isolation and Identification of *vanB*-Containing Vancomycin-Resistant Enterococci from Faeces and Rectal Swabs. JCM. 46 (12) 4034-4036.
4. Manley, K J., Fraenkel, M B., Mayall B C. and Power, D A. (2007). Probiotic treatment of vancomycin-resistant Enterococci: a randomised controlled trial. MJA. 186 (9): 454-457.

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