

Evaluation Of A New Screening Medium For The Detection Of Group B Streptococci (GBS)

C. Hopper, M. Oleksiuk.

Thermo Fisher Scientific, Wade Road, Basingstoke, Hants, RG24 8PW, UK.

Overview

Purpose: To evaluate the sensitivity and specificity of *Brilliance*TM GBS Agar and compare performance to chromogenic and non-chromogenic competitor plates.

Methods: Each plate was inoculated at levels of 10⁶ to 10⁸, 10² to 10⁴ and 10¹ to 10³ cfu/mL, incubated according to manufacturers' instructions and results interpreted at 16, 18, 24 and 48 hrs.

Results: *Brilliance* GBS Agar demonstrated a high level of sensitivity whilst inhibiting growth of non-GBS isolates.

Introduction

Group B streptococci can be found in up to 30% of healthy women and can infect newborns during delivery, causing severe sepsis and meningitis¹. In the UK and Ireland, around 1 in 2,000 babies born develops early-onset GBS infection. However, in the UK, there is currently no GBS screening program in place².

Oxoid *Brilliance*TM GBS Agar is a newly developed, defined chromogenic medium for the detection of GBS isolates. Unlike traditional, non-chromogenic agars, *Brilliance* GBS Agar does not rely on anaerobiosis and has been designed to detect non-beta haemolytic GBS more easily.

Methods

0.5 McFarland standard suspensions with an inoculum range of 10⁶-10⁸ cfu/mL were prepared for all GBS and species other than GBS (including other Streptococcus species, staphylococci, Enterobacteriaceae, lactobacilli and Candida species). For GBS isolates, the following plates were inoculated with levels of 10⁶-10⁸, 10²-10⁴ and 10¹-10³ cfu/mL and 10⁴-10⁶ and 10²-10⁴ cfu/mL for all non-GBS isolates; *Brilliance* GBS Agar, BioRad StrepBSelect Agar, BBLTM CHROMagarTM Strep B Agar and ChromIDTM Strepto B Agar, as well as BD Granada Agar and Oxoid Islam Agar which are both non-chromogenic plates. Plates were incubated according to manufacturers' instructions, and colony colour, size and amount of growth recorded after 24 hrs. incubation.

Additionally, ten mixed cultures consisting of one GBS isolate and two species other than GBS were prepared and 100µL L-spread onto each media, incubated according to manufacturers' instructions and read at 24 hrs.

FIGURE 1. Growth of positive, pink GBS colonies on *Brilliance* GBS Agar after 24 hrs. incubation.



FIGURE 2. Sensitivity values of each plate after 24 hrs. incubation and at an inoculum level of 10⁶ to 10⁸ cfu/mL

Plate	Sensitivity
<i>Brilliance</i> GBS Agar	97.0% (95% CI = 93.7-100%)
BioRad StrepBSelect Agar	100.0% (95% CI = 100%)
BBL CHROMagar Strep B Agar	100.0% (95% CI = 100%)
ChromID StreptoB Agar	96.0% (95% CI = 92.2-99.8%)
BD Granada Agar	92.0% (95% CI = 86.7-97.3%)
Oxoid Islam Agar	71.0% (95% CI = 62.1-79.9%)

Results

Sensitivity

Sensitivity was calculated based on the presence of correctly coloured, pink GBS colonies (see Figure 1.) As Figure 2. above shows, after 24 hrs. incubation and at an inoculum level of 10⁶ to 10⁸ cfu/mL, *Brilliance* GBS Agar achieved 97.0% sensitivity. This result was statistically significantly better than both Oxoid Islam Agar (P=0.0001) and BD Granada Agar (P=0.0026).

Additionally, at the lower inoculum level of 10² to 10⁴ cfu/mL, and after 24 hrs. incubation, *Brilliance* GBS Agar achieved a sensitivity value of 94.0%, performing statistically significantly better than ChromID StreptoB Agar (P=0.0017), BD Granada Agar (P=0.0164) and Oxoid Islam Agar (P=0.0001).

Specificity

Specificity results were also excellent. As Figure 3. shows, after 24 hrs. incubation, and at an inoculum level of 10⁴-10⁶, *Brilliance* GBS Agar achieved 100% specificity. In comparison, Oxoid Islam Agar achieved 100%, BD Granada Agar achieved 100%, ChromID StreptoB Agar achieved 97.3%, BioRad StrepBSelect Agar achieved 95.3% and CHROMagar Strep B Agar achieved 89.3% specificity.

Of all the chromogenic media tested, *Brilliance* GBS Agar was the most selective. As Figure 4. shows, after 24 hrs. incubation, *Brilliance* GBS Agar completely inhibited 99.3% of the non-GBS isolates tested, with the next best-performing plate only achieving 82.6% inhibition.

FIGURE 3. Specificity values of each plate after 24 hrs. incubation and at an inoculum level of 10⁴ to 10⁶ cfu/mL

Plate	Specificity
<i>Brilliance</i> GBS Agar	100.0% (95% CI = 100%)
BD Granada Agar	100.0% (95% CI = 100%)
Oxoid Islam Agar	100.0% (95% CI = 100%)
ChromID StreptoB Agar	97.3% (95% CI = 94.3-99.7%)
BioRad StrepBSelect Agar	95.3% (95% CI = 92-98.7%)
BBL CHROMagar Strep B Agar	89.3% (95% CI = 84.4-94.3%)

FIGURE 4. % inhibition of non-GBS isolates on each of the plates tested after 24 hrs. incubation and at an inoculum level of 10⁴ to 10⁶ cfu/mL

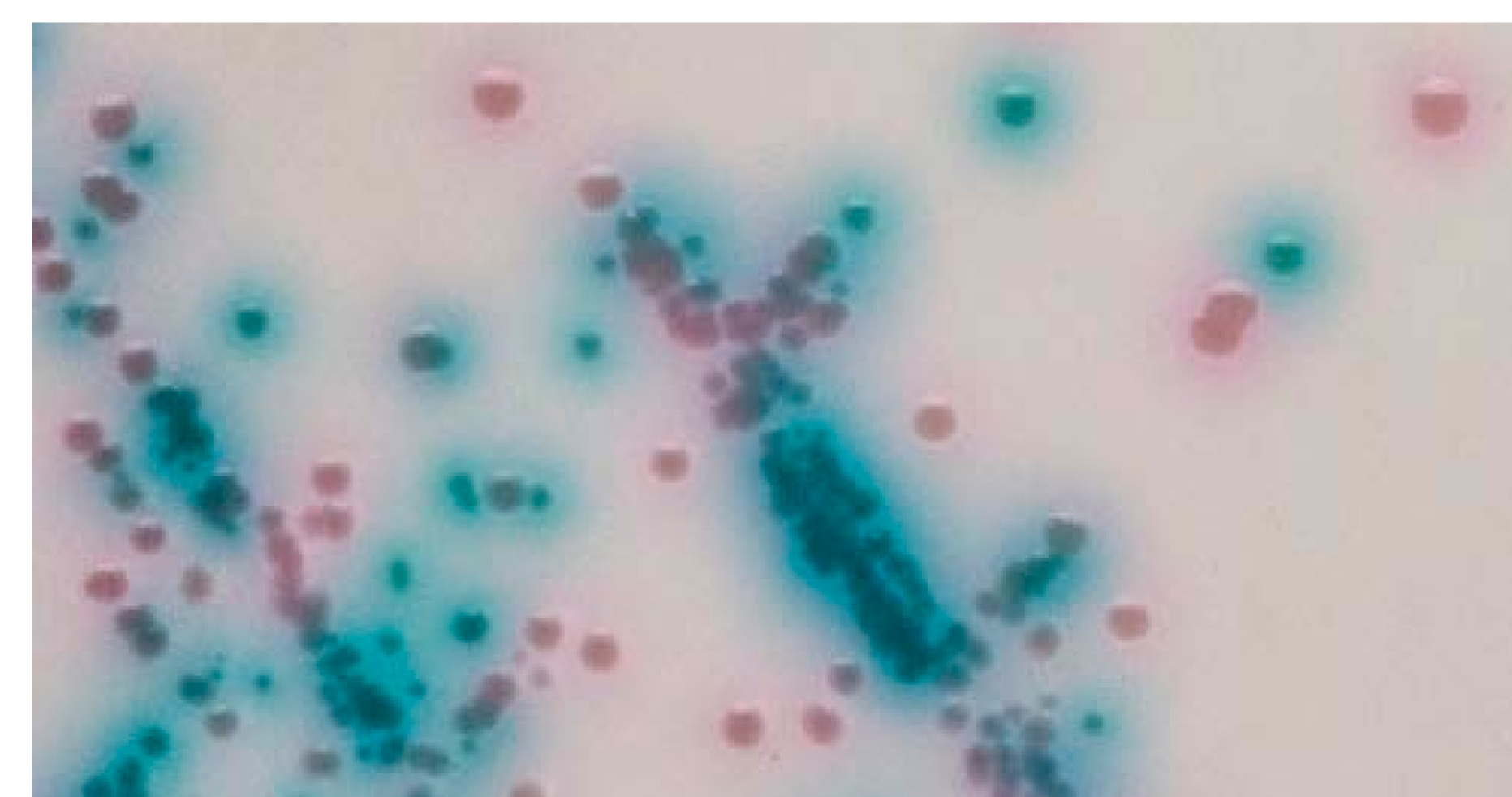
Plate	% inhibition
<i>Brilliance</i> GBS Agar	99.3
ChromID StreptoB Agar	82.6
BBL CHROMagar Strep B Agar	74.3
BD Granada Agar	72.6
BioRad StrepBSelect Agar	71.3
Oxoid Islam Agar	22.6

Mixed Cultures

Brilliance GBS Agar performed excellently when tested with mixed cultures. Nine of the ten mixed cultures tested were completely inhibited, with just one mixed culture producing mixed colonial growth (see Figure 5.).

All other media were less selective, showing mixed colonial growth on a number of plates.

FIGURE 5: Presence of pink GBS colonies and blue non-GBS colonies on *Brilliance* GBS Agar



Conclusion

Brilliance GBS Agar is an easy-to-read GBS screening medium that provides rapid, accurate results within 24 hrs. Based on innovative InhibigenTM technology, *Brilliance* GBS Agar is a highly selective media, demonstrating a high level of sensitivity whilst inhibiting growth of non-GBS isolates.

References

- Rinaudo et al. (2010) Specific Involvement of Pilus Type 2a in Biofilm Formation in Group B *Streptococcus*. PLoS ONE 5(2): e9216.
- UK NSC Policy Database; <http://www.screening.nhs.uk/groupbstreptococcus>, accessed 29/08/2012.

© 2013 Thermo Fisher Scientific Inc. All rights reserved. ChromID is a trademark of BioMérieux, BBL is a trademark of BD and CHROMagar is a trademark of CHROMagar Microbiology. The *Brilliance* and Inhibigen trademarks are the property of Thermo Fisher Scientific Inc. and its subsidiaries. This information is not intended to encourage use of these products in any manner that might infringe the intellectual property rights of others.
Folio number LT2071A, 01/13