A Comparative Evaluation Of *Brilliance* GBS Agar And Traditional Media For The Detection Of Group B Streptococci From Women Undergoing GBS Screening

E, Scopes[1], T. Mertes[2], C. Dörbecker[2], P. Kleemann[2], M. Meppen[2], C. Rausch[2].
[1]Thermo Fisher Scientific, Basingstoke, Hampshire, UK. [2]Medical Laboratory Koblenz-Mittelrhein, Koblenz, Germany.

Overview

Purpose: A study was conducted to evaluate the use of direct plating of GBS screening swabs onto Thermo Scientific™ *Brilliance*™ GBS Agar (Thermo Fisher Scientific), Columbia Blood Agar (CBA) and Tryptone Soya Agar + sheep blood (TSA-b) alongside LIM Broth enrichment.

Methods: Four hundred and ninety nine swabs were directly plated onto *Brilliance* GBS Agar, CBA and TSA-b prior to enrichment in LIM Broth. After enrichment, the broth was then streaked onto the same three agar media. Presumptive GBS observed on any of the agar media were confirmed using Thermo Scientific™ Streptex™ Latex Group B (Thermo Fisher Scientific) and MALDI-TOF (Bruker).

Results: As an agar medium for detecting solely GBS, *Brilliance* GBS Agar was able to detect more GBS than the two blood-containing media whether swabs were directly plated or enriched in LIM Broth prior to plating. Due to the selective nature of the plate, *Brilliance* GBS Agar also suppressed growth of non-target organisms far more than the blood-containing media.

Introduction

Streptococcus agalactiae (group B streptococcus (GBS)) is a leading cause of neonatal sepsis, meningitis, and pneumonia, affecting 0.5 to 2 newborns per 1,000 live births in Europe[1]. Screening for antenatal GBS carriage is recommended in the US by the Centers for Disease Control and Prevention (CDC). This is reflected in many European countries, including Germany, which offers universal antenatal screening for GBS between 35 and 37 weeks gestation[2, 3].

Brilliance GBS Agar is a transparent screening medium specifically designed for the isolation and presumptive identification of GBS. GBS will grow as pink-coloured colonies on the medium. The inclusion of Inhibigen™ technology enhances the plate by inhibiting non-target organisms without affecting the growth of GBS. This technology works by targeting organism-specific enzymatic reactions through the uptake and cleavage of inhibitory agents, leading to cell lysis. The result is a significant reduction in non-GBS growth on the plate, thus offering advantages over other screening media available[4].

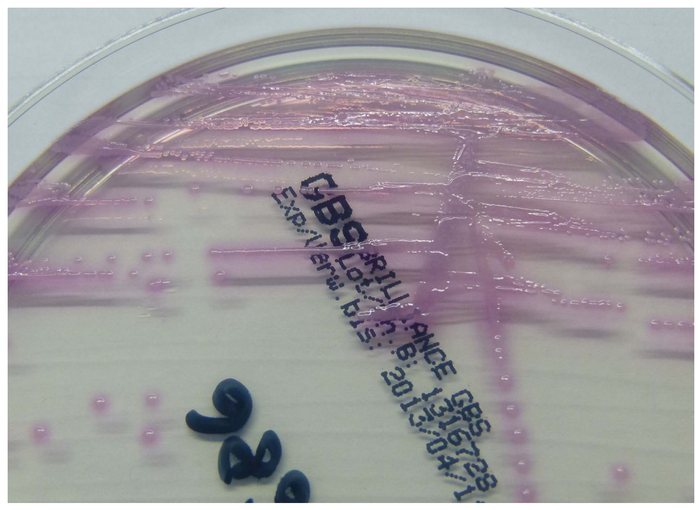
Methods

Four hundred and ninety nine vaginal and cervical swabs collected from pregnant and non-pregnant women undergoing screening for GBS, born between 1960 and 2000 were tested over a period of six weeks. Swabs were stored at 4-8°C for no longer than 72 hr. All swabs were removed from refrigerated storage and allowed to equilibrate to room temperature prior to testing.

A portion of transport medium from each swab was inoculated onto the primary bed of *Brilliance* GBS Agar, CBA and TSA-b and streaked to ensure individual colonies. Each swab was then inoculated into LIM Broth (Todd Hewitt Broth and colistin and nalidixic acid) and incubated at 35±1ºC for 18-24 hr. Ten µl of the broth was then subcultured onto *Brilliance* GBS Agar, CBA and TSA-b. All plates were incubated aerobically at 36±1ºC for 18-24 hr.

Any presumptive GBS positive colonies on any of the media (typical cream/white colonies with or without beta-haemolysis on Columbia Agar and TSA-b and pink colonies on *Brilliance* GBS Agar) were confirmed using Streptex Latex Group B. Growth of any colonies (irrespective of colour) were identified using MALDI-TOF (Bruker).

FIGURE1. GBS isolated on *Brilliance* GBS Agar during the study



Results

A greater number of GBS were isolated when swabs were enriched in LIM Broth prior to plating onto agar media. From the 499 swabs tested, a total of 77 swabs (15.4%) were confirmed positive for GBS from one or more of the agar media tested when swabs were directly plated onto the media. Ninety seven swabs (19.4%) were confirmed positive for GBS from one or more of the agar media tested when swabs were enriched in LIM Broth prior to inoculation onto *Brilliance* GBS Agar, CBA and TSA-b.

Brilliance GBS Agar detected more GBS than either of the two blood-containing agars, after direct plating and broth enrichment of the swabs.

Performance of *Brilliance* GBS Agar, CBA and TSA-b after direct plating and broth enrichment of swabs is shown in tables 1 and 2.

TABLE 1. Performance of *Brilliance* GBS Agar, CBA and TSA-b after direct plating of swabs

Performance	*Brilliance* GBS Agar	CBA	TSA-b
Sensitivity (%)	97.4 (95% CI = 96.0-98.8)	85.7 (95% CI = 82.6-88.8)	72.7 (95% CI = 68.8-76.6)
Specificity (%)	96.7 (95% CI = 95.1-98.3)	100.0 (95% CI = 100)	100.0 (95% CI = 100)

TABLE 2. Performance of *Brilliance* GBS Agar, CBA and TSA-b after broth enrichment of swabs

Performance	*Brilliance* GBS Agar	CBA	TSA-b
Sensitivity (%)	99.0 (95% CI = 98.1-99.9)	93.8 (95% CI = 91.7-95.9)	92.1 (95% CI = 89.7-94.5)
Specificity (%)	94.0 (95% CI = 91.9-96.1)	100.0 (95% CI = 100)	100.0 (95% CI = 100)

Sensitivity of *Brilliance* GBS Agar was statistically significantly higher than CBA (P=0.0159) and TSA-b (P=0.0002) when swabs were directly plated onto the agar media. Sensitivity of *Brilliance* GBS Agar was also higher than CBA and TSA-b (but not statistically significantly so) when swabs were broth enriched prior to plating onto the agar media.

The percentage inhibition of *Brilliance* GBS Agar, CBA and TSA-b is summarised in table 3. Percentage inhibition calculates the number of swabs showing no growth of non-target organisms; the higher the percentage inhibition, the less background flora will be present on the agar media, thus improving isolation of GBS colonies.

TABLE 2. Percentage inhibition of Brilliance GBS Agar, CBA and TSA-b

Method	*Brilliance* GBS Agar	CBA	TSA-b
LIM Broth enrichment	70.9 %	33.5%	31.5%
Direct plating	68.3%	9.8%	9.8%

Conclusion

As an agar medium for detecting solely GBS, *Brilliance* GBS Agar was able to detect more GBS than the two blood-containing media whether swabs were directly plated or LIM Broth enriched prior to plating. Broth enrichment did increase the number of GBS detected but also resulted in the need to confirm more pink colonies on *Brilliance* GBS Agar.

References

1.Trijbels-Smeulders M. A., Kollee L. A., Adriaanse A. H., Kimpen J. L., Gerards L. J. (2004). Neonatal group B streptococcal infection: incidence and strategies for prevention in Europe. Paediatric Infectious Disease. J.23:172–173.
2.Verani, J. R., McGee, L. Schrag, S. J. Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases (2010). Prevention of Perinatal Group B Streptococcal Disease. Revised Guidelines from CDC
3.Afshar, B., Broughton, K., Creti, R., Decheva, A., Hufnagel, M., Kriz, P., Lambertsen, L., Lovgren, M., Melin, P., Orefici, G., Poyart, C., Radtke, A., Rodriguez-Granger, J., Skov Sørensen, U. B., Telford, J., Valinsky, L., Zachariadou, L., members of the DEVANI Study Group and Efstratiou, A. (2011) International External Quality Assurance for Laboratory Identification and Typing of *Streptococcus agalactiae* (Group B Streptococci) J. Clinical Microbiology vol. 49 no. 4 1475-1482.
4.http://www.oxoid.com/UK/blue/prod_detail/prod_detail.asp?pr=PO5320A&c=UK&lang=EN (accessed August 2013)

LT2111A October 2013

Thermo SCIENTIFIC