Evaluation of New Strep B Carrot Broth™ One-Step in the Detection of Group B Streptococci: A Multi-Center Study

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Abstract

A total of 884 vaginal/vaginal clinical specimens were submitted to the clinical microbiology laboratory for routine assessment of GBS colonization from 11/2015 to 10/2016 as part of a multi-center study. Specimens were analyzed in a liquid-based transport system (i.e., Eswab® or TransPro®) and were kept refrigerated for a maximum of 5 days if not immediately processed. Specimens stored in a sponge-based transport system (i.e., Healhtrek Corporation Transporter®) were kept refrigerated at 4°C for up to 3 days. In addition, all specimens were subcultured to 5% Sheep Blood Agar. All isolates recovered on Blood Agar were confirmed as GBS via traditional methods such as Gram-stain, followed by catalase reaction and Lancefield group latex agglutination. Colonies that were hemolytic on Blood Agar, Gram positive, catalase negative, and Group B Streptococci by latex agglutination were considered positive. All isolates recovered on Blood Agar were confirmed as GBS via traditional methods such as Gram-stain, followed by catalase reaction and Lancefield group latex agglutination.

Methods

A total of 884 clinical specimens were submitted to the clinical microbiology laboratory for routine assessment of GBS colonization from 11/2015 to 10/2016 as part of a multi-center study. Specimens stored in a liquid-based transport system (i.e., Eswab® or TransPro®) were kept refrigerated for a maximum of 5 days if not immediately processed. In order to use sponge-based transport systems, the liquid was squeezed from the sponge using a hemostat on the outside of the transport tube, and then aseptically transferred to a sterile vial for easy pipetting.

**Table 1**

<table>
<thead>
<tr>
<th>Site</th>
<th>LIM Reference Method vs. Strep B Carrot Broth™ Colour reaction</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>95% CI Sensitivity</th>
<th>95% CI Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>Central Coast Pathology Laboratory, San Luis Obispo, CA</td>
<td>91</td>
<td>99</td>
<td>89.1</td>
<td>90.4</td>
</tr>
<tr>
<td>Site 2</td>
<td>Walli Cornell Medical College, New York, NY</td>
<td>92</td>
<td>99</td>
<td>90.2</td>
<td>91.2</td>
</tr>
<tr>
<td>Site 3</td>
<td>Central Coast Pathology Laboratory, San Luis Obispo, CA</td>
<td>91</td>
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<td>90.4</td>
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**Conclusion**

- All False Positives by both Carrot Broth™ products were later confirmed as β-hemolytic GBS. More positive cultures were detected by Carrot Broth™ products than the reference method.
- Of the 73 False Negatives by color reaction (38 from CB One-Step and 35 from CB Kit), 67 were subsequently detected by subculture.
- Carrot Broth™ Kit demonstrated 84.5% sensitivity and 98.6% specificity prior to subculture compared to the reference method. Sensitivity was enhanced to 98.8% upon subculture of non-orange/red tubes.
- Carrot Broth™ One-Step demonstrated 84.5% sensitivity and 98.6% specificity prior to subculture compared to the reference method. Sensitivity was enhanced to 98.8% upon subculture of non-orange/red tubes.
- There were 10 False Positives overall. All isolates were confirmed to be β-hemolytic GBS and considered true positives in discrepant analysis. Of the false positives, all were isolated on Blood Agar and confirmed as GBS by latex agglutination. Two isolates were confirmed as hemolytic Group B Strep and considered true positives in discrepant analysis.
- There were 3 False Negatives overall. All isolates were confirmed as β-hemolytic GBS and considered true positives in discrepant analysis. Of the false negatives, all were isolated on Blood Agar and confirmed as GBS by latex agglutination. Two isolates were confirmed as hemolytic Group B Strep and considered true positives in discrepant analysis.

**Table 2**

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**Results**

Introduction

Approximately 10-25% of women are asymptomatic carriers of group B Streptococci (GBS) in the genital and gastrointestinal tract. (1) Group B Streptococci (GBS) remains a leading cause of serious illness and death in newborns and pregnant women, and the detection of Group B Streptococci in the vaginal-rectal area is critical to the prevention of neonatal GBS disease. Several surveys have been conducted that show the incidence of neonatal sepsis and meningitis due to GBS is currently 0.5-3 cases per 1,000 live births, although there are substantial geographical and racial differences. (2) The case-fatality rates are now declining due to prompt recognition and appropriate treatment. (3) The Centers for Disease Control and Prevention (CDC) recommends the screening of all pregnant women for vaginal and rectal Group B Streptococci colonization between 35 and 37 weeks of gestation using an enrichment broth, followed by subculture. (4) Strep B Carrot Broth™ and Strep B Carrot Broth™ One-Step are selective and differential enrichment broths with selective components designed to enrich for Group B Streptococci. The production of a pink or orange-red, or brick-red color is a unique characteristic of hemolytic GBS due to reaction with substrates such as starch, peptone, serum, and fulvic pathway inhibitors. GBS detection with Strep B Carrot Broth™ and Strep B Carrot Broth™ One-Step is only possible with β-hemolytic Group B Streptococci colonies, providing evidence of a direct genetic linkage between pigment production in this media and hemolysin production.

Conclusions

- All False Positives by both Carrot Broth™ products were later confirmed as β-hemolytic GBS. More positive cultures were detected by Carrot Broth™ products than the reference method.
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**References**