Evaluation of Accuracy of StrepB Carrot Broth™ in the Detection of Different Serotypes of Group B Streptococci (GBS)

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Abstract
Detection of GBS in the vaginal-anorectal area is critical for the prevention of neonatal GBS disease. Several microbiological assays employing different methods have been developed worldwide with increased sensitivity, reduced costs, and shorter turnaround time for the detection of GBS. However, very little has been documented concerning the accuracy of each methodology in the detection of different serotypes of GBS. The goal of this study was to evaluate StrepB Carrot Broth™ against several serotypes of GBS and a few non-hemolytic strains of Enterococci and Streptococcus. A total of 50 isolates (45 GBS of several serotypes, four pigmented Enterococcus, and one Streptococcus porcinus) were retrieved from Centers for Disease Control and Prevention’s collection and inoculated into StrepB Carrot Broth™ in order to evaluate the ability of the medium to accurately identify GBS. Overall, StrepB Carrot Broth™ demonstrated 100% sensitivity and specificity against all the beta-hemolytic GBS, and produced no false positives against pigmented Enterococcus and S. porcinus which is known to cross-react with group B antiserum. As expected, all non-hemolytic GBS produced negative results. Based on these findings, StrepB Carrot Broth™ can be employed as a reliable method for the detection of beta-hemolytic Group B Streptococci.

Introduction
Approximately 10% to 30% of pregnant women are colonized with GBS in the vaginal-rectal region which can be transmitted to the neonate during delivery resulting in sepsis, pneumonia, or other complications. GBS is the most frequent cause of systemic infection in neonates under 7 days of age. To prevent GBS infections in neonates, the CDC recommends screening of pregnant women for all beta-hemolytic GBS. Overall, StrepB Carrot Broth™ demonstrated 100% sensitivity and specificity against all the beta-hemolytic GBS, and produced no false positives against pigmented Enterococcus and S. porcinus which is known to cross-react with group B antiserum. As expected, all non-hemolytic GBS produced negative results. Based on these findings, StrepB Carrot Broth™ can be employed as a reliable method for the detection of beta-hemolytic Group B Streptococci.

Introduction (continued)
making identification easy StrepB Carrot Broth™ (Hardy Diagnostics, Santa Maria, CA) is a test tube assay based on this principle. StrepB Carrot Broth™ is designed to detect GBS directly from a patient specimen without the need for subculture or pre-Isolation. StrepB Carrot Broth™ is a selective and differentiable media and will detect GBS within 6 to 24 hours after inoculation.

Previous studies have evaluated StrepB Carrot Broth™ for sensitivity and specificity. The purpose of this study is to determine the accuracy of StrepB Carrot Broth™ in the detection of different serotypes of GBS. GBS has been classified into nine serotypes: Ia, Ib, II, III, IV, V, VI, VII, and VIII. The majority of isolates from pregnant women and infected neonates in the United States are serotypes Ia, II, III, and VI-VIII. Serotypes VI and VII are becoming more predominant in Japan while serotype IV is emerging in Europe. Serotype III GBS is associated with more invasive disease in infants than any other serotype. Due to the variety of serotypes commonly isolated it is vital that detection methods for GBS accurately identify all serotypes.

Results
Table 1: Accuracy of StrepB Carrot Broth™ in the detection of different serotypes of Beta Hemolytic Streptococcus agalactiae.

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of Isolates Tested</th>
<th>Number of Isolates StrepB Carrot Broth™ positive</th>
<th>% Isolates Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. agalactiae (var)</td>
<td>9</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>S. porcinus</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>S. casseliflavus</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>S. faecalis (variant)</td>
<td>3</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Discussion
• StrepB Carrot Broth™ detected all beta-hemolytic GBS regardless of serotype.
• None of the non-GBS strains tested positive using StrepB Carrot Broth™, including S. porcinus which is known to cross-react with group B antiserum.
• As expected none of the non-hemolytic GBS strains tested positive.
• StrepB Carrot Broth™ was 100% sensitive and specific against all reference isolates tested.

Based on these findings StrepB Carrot Broth™ can be considered a reliable test for detection of all beta-hemolytic GBS.

Materials and Methods
All of the strains tested were retrieved from the Center for Disease Control and Prevention’s collection.

• 50 total strains were tested.
• All GBS strains were tested.
• 9 non-hemolytic strains were tested.
• 5 Non-GBS strains (4 pigmented Enterococcus and 1 S. porcinus) were tested.

Suspension Preparation and Inoculation
• Swabs were used to inoculate the StrepB Carrot Broth™ as per the manufacturer’s instructions.
• Cultures were incubated at 35°C for 24 hours.

Interpretation
• All tubes that turned orange were considered positive.
• All tubes that formed small color to red spots on the surface were considered weakly positive.
• All tubes which showed no color change were considered negative.

References
22. R. Facklam¹, J. Elliott¹, A. Y. Hasung², R. Clasen², G. Peterson², S. Strickler², J. Hardy²