Evaluation of StrepB Carrot Broth™ and LIM Broth Methods for Recovery of Group B Streptococci (GBS). Results of a Multi-Center Trial


University of Illinois, Chicago; Illinois; University of North Carolina, Chapel Hill; North Carolina; Gilcrest Memorial Hospital; Elmhurst, Illinois; Health Line Clinical Laboratories; Burbank, California; Summa Health System, Akron, Ohio; Parkview Medical Center, Pueblo, Colorado; French Hospital, San Luis Obispo, California; Christus Spohn Hospital, Corpus Christi, Texas; Hardy Diagnostics, Santa Maria, California

Revised Abstract

Intrapartum colonization of group B Streptococci (GBS) is a major risk factor for early-onset neonatal sepsis and remains as a significant source of morbidity in perinatal care. Several microbiological assays employing different methods have been previously conducted as seen in Granada Agar [1, 6, 7]. The production of orange to brick red pigments is a unique characteristic of hemolytic GBS due to reaction with ingredients such as eosin Y. A color change was observed in as little as 6 hours in StrepB Carrot Broth™ for specimens that had a high GBS count. Almost all positive cultures were detectable within 24 hours of incubation. The StrepB Carrot Broth™ tubes were examined after 24 hours of incubation for any degree of color change. Any cultures that did not present suspect colonies were re-incubated for an additional 18 to 24 hours and re-tested by CAMP test or latex agglutination. All suspected colonies from the subculture plate were tested with LIM Broth. The isolate was latex agglutination positive for group B Streptococci, however, further identification confirmed this isolate as *Streptococcus porcinus*. The false positive that occurred in the LIM Broth method only. The overall the sensitivity/specificity for Carrot Broth was demonstrated greater sensitivity and shorter turnaround time than the LIM Broth method. Furthermore, the StrepB Carrot Broth™ method uses only one tube of media for positives, without the need for further testing or subculture. Based on these findings, StrepB Carrot Broth™ can be used as a reliable method for GBS detection.

Materials & Methods

Participants

Eight centers that provide services to OB/GYN clinics and currently employing the CDC recommended LIM broth methodology in GBS screening were selected for this study.

- University of Illinois, Chicago
- University of North Carolina, Chapel Hill, North Carolina
- Gilcrest Memorial Hospital, Elmhurst, Illinois
- Health Line Clinical Laboratories, Burbank, California
- Summa Health System, Akron, Ohio
- Parkview Medical Center, Pueblo, Colorado
- French Hospital, San Luis Obispo, California
- Christus Spohn Hospital, Corpus Christi, Texas

Study Duration

This study was conducted between March to October 2004.

Patient Eligibility and Sample Collection

- Pregnant patients between 35 to 37 weeks of gestation.
- Specimens from the lower vagina and rectum for GBS late in gestation during prenatal care can detect the presence of *Streptococcus agalactiae* in association with clinical symptoms.

Microbiological Analysis

The specimens were evenly divided by placing the swabs in saline and inoculating into StrepB Carrot Broth™ and LIM Broth according to manufacturer’s recommendations, followed by incubation at 35°C for 18 – 24 hours.

For all LIM broth tubes incubated after the isolation period a 5% sheep blood agar plate and incubated for 18 to 24 hours was used as positive control; and LIM broth only was used as negative control. All colonies suggestive of GBS were confirmed by CAMP test or latex agglutination. Plates that did not present suspect colonies were re-incubated for an additional 18 to 24 hours and re-tested for GBS.

- All the StrepB Carrot Broth™ tubes were examined after 24 hours of incubation for any degree of color change. Any cultures that did not present suspect colonies were re-incubated for an additional 18 to 24 hours and re-tested by CAMP test or latex agglutination.

StrepB Carrot Broth™

- All the StrepB Carrot Broth™ tubes were examined after 24 hours of incubation for any degree of color change. Any cultures that did not present suspect colonies were re-incubated for an additional 18 to 24 hours and re-tested by CAMP test or latex agglutination.

Quality Control

- All the LIM broth tubes were subcultured after the isolation period to a 5% sheep blood agar plate and incubated for 18 to 24 hours.
- All colonies suggestive of GBS were confirmed by CAMP test or latex agglutination.
- Plates that did not present suspect colonies were re-incubated for an additional 18 to 24 hours and re-tested for GBS.

Results

| Table 1: Overalls Results of StrepB Carrot Broth™ vs. LIM Broth, Multi-Center Trial Study |
|------------------------------------------|-----------------|-----------------|-----------------|
| Specimen | StrepB Carrot Broth™ only | LIM Broth only | StrepB Carrot Broth™ vs. LIM Broth |
| Sensitivity | 92% (21/23) | 82% (18/22) | 10% (3/30) |
| Specificity | 100% (52/52) | 95% (49/52) | 5% (2/40) |
| Positive Predictive Value | 98% (20/20) | 89% (18/20) | 9% (2/22) |
| Negative Predictive Value | 99% (50/50) | 97% (49/50) | 3% (1/30) |

Discussion

The rate of detection of GBS in this study is in accordance to recent surveys and publications [5, 9-13]. The StrepB Carrot Broth™ demonstrated superior sensitivity and specificity, compared to the LIM broth method. There was one false positive case with LIM broth. The isolate was latex agglutination positive for group B Streptococcus; however, further identification confirmed this isolate as *Streptococcus porcinus*. The rate of detection of GBS in this study is in accordance to recent surveys and publications [5, 9-13].

Conclusions

- Overall, 86% (21/24) of isolates were screened as positive for GBS.
- The positive result ranged from 15% to 21% between the participating centers.
- Among the positive samples, 16% (4/24) were detected by both methodologies.
- Seventy cases were detected by StrepB Carrot Broth™ only. Two of these cases were not detected by StrepB Carrot Broth™ due to overwhelming of GBS culture.
- All positive percentages for StrepB Carrot Broth™ falsies were 100% and 100%.
- LIM Broth’s sensitivity and specificity were 80% and 80% respectively.
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Acknowledgements

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StrepB Carrot Broth™ autolytic media was supplied by Hardy Diagnostics.

References