

Comparison of Commercially Available Methods (StrepB Carrot Broth™ and GBS Medium) for the Detection of Group B Streptococcus

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Abstract

Group B Streptococci (GBS) remains one of the leading causes of sepsis and meningitis in newborns despite recent advances in the prevention of neonatal group B streptococcal (GBS) disease. Although the current gold standard method is the LIM broth method, as recommended by the Centers for Disease Control and Prevention (CDC), several alternative methods have been developed with comparable sensitivity, specificity, and reduced turnaround time. The purpose of this study was to determine the accuracy of two recently launched products: StrepB Carrot Broth™ (Hardy Diagnostics, Santa Maria, CA) and GBS Medium (Northeast Laboratory Services, Winslow, ME).

A total of 100 vaginal-rectal specimens were collected during the second half of 2005 and tested in parallel by both methods. Overall, 25 (25.0%) specimens were detected as positive for GBS of which 23 yielded beta-hemolytic GBS and two were non-beta-hemolytic strains. StrepB Carrot Broth™ detected 23 of 25 (all of beta-hemolytic ones) while GBS Medium detected seven of 25.

As described elsewhere, detection of GBS based on development of orange-pigment reaction (as demonstrated in Granada media) is only effective against beta-hemolytic strains of GBS. In the present study, StrepB Carrot Broth™ showed 100% sensitivity and specificity against beta-hemolytic strains of GBS with strong color reactions without need for further confirmation while GBS Medium only detected 28% of the positives. Based on this evaluation, StrepB Carrot Broth™ can be used as a reliable tool for detection of hemolytic GBS in pre-natal screening.

Introduction

Group B Streptococcus (GBS) is the most frequent cause of systemic infection in neonates under seven days of age.⁽¹⁾ Neonates can acquire GBS during birth from their mothers, who are colonized with GBS. Approximately 10% to 30% of pregnant women are colonized with GBS in the vaginal-rectal region.⁽²⁾ Early onset disease is defined as GBS infection during the first seven days of life and constitutes approximately 80% of GBS infections.⁽³⁾ GBS infections in neonates can result in sepsis, meningitis, pneumonia, and other serious conditions. Accurate detection of GBS in the vaginal-rectal region is vital to the prevention of neonatal GBS disease. Due to screening efforts and the

Introduction (continued)

use of intrapartum antibiotics it is estimated that 3,900 infections in neonates and 200 neonatal deaths were prevented.⁽⁴⁾

To prevent neonatal infection the CDC recommends screening all pregnant woman for vaginal and rectal GBS between 35 and 37 weeks of gestation.⁽⁵⁾ The current gold standard method for GBS detection is incubation of specimen in LIM broth followed by subculture onto a blood agar plate. Alternatives to this method of detecting GBS have been developed with comparable or even superior sensitivity and selectivity. These alternatives have been developed to reduce turnaround time, cost, and personnel time.⁽⁶⁾

StrepB Carrot Broth™ (Hardy Diagnostics, Santa Maria, CA) and GBS Medium (Northeast Laboratory Services, Winslow, ME) are selective and differential media which detect GBS within 6 to 24 hours. Both of the test methods are designed to give rapid results without relying on subculture from a selective enrichment broth. This decreases the time and expertise required for test setup. Detection of GBS is based on the production of an orange pigment by GBS when grown on media containing starch, proteose peptone, and other pigment enhancing supplements. The production of this orange pigment is limited to human strains of beta-hemolytic GBS as the genes for hemolysis and pigment production are closely linked.⁽⁶⁾ Approximately 93-98% of all GBS strains isolated from clinical specimens have been described to be beta-hemolytic.⁽⁷⁾ The intent of this study was to compare the ability of StrepB Carrot Broth and GBS Medium to detect GBS from rectal-vaginal specimen.

Materials and Methods

- GBS screening samples were collected at Central Coast Pathology Consultants, San Luis Obispo, CA between June 2005 and December 2005.
- Samples were collected using swabs, vortexed in saline, and the suspension was evenly pipetted into StrepB Carrot Broth™ and GBS Medium.
- Tests were setup, incubated, and read in accordance with manufacturer's instructions.

Results

Table 1: Comparison of sensitivity between StrepB Carrot Broth™ and GBS Medium on clinical specimens tested.

		StrepB Carrot Broth™	GBS Medium
GBS Positive (n=25)	Total Positive Reactions	23 (92%)	7 (28%)
	Strong Positive Reactions	23 (92%)	3 (12%)
	Weak Positive Reactions	0 (0%)	4 (16%)
	Negative Reactions	2* (8%)	18** (72%)
GBS Negative (n=75)	Positive Reactions	0 (0%)	0 (0%)
	Negative Reactions	75 (100%)	75 (100%)
Total	Total Tested	100	100

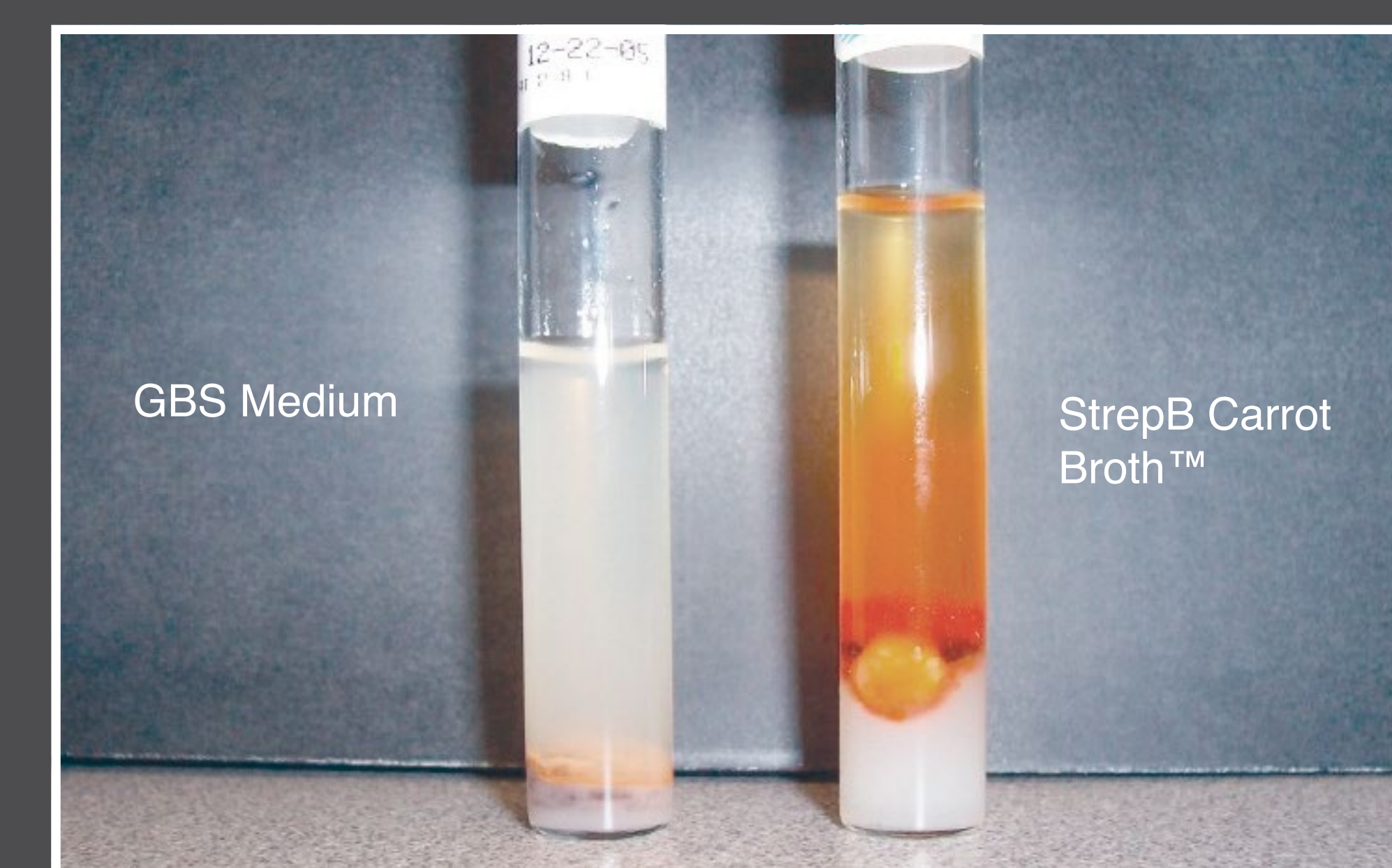
* Non-hemolytic strains of GBS, not expected to be positive on StrepB Carrot Broth™

** Two of the strains were non-hemolytic

- 25 of 100 (25%) of clinical specimens tested were positive for GBS.
- StrepB Carrot Broth™ successfully detected all hemolytic strains (n=23), with strong positive reactions.
- GBS Medium detected 30.4% (7 specimens) of hemolytic strains of which 13% (3 specimens) presented strong positive reactions.
- 18 (72%) of the 25 positive specimens were undetected by the GBS Medium.
- As predicted, non-hemolytic strains were not detected by either test method.
- Neither StrepB Carrot Broth™ nor GBS Medium gave false positive results.

Discussion

- StrepB Carrot Broth™ was shown to be 100% sensitive and specific in detecting hemolytic GBS from patient specimens.
- The rate of detection of GBS in this study by StrepB Carrot Broth™ is in accordance with recent surveys and publications (1-4, 8,10).
- Non-hemolytic GBS strains cannot be detected by either method. This is to be expected as hemolysis and pigment production are closely linked (12).
- Based on these findings, StrepB Carrot Broth™ can be considered as a reliable method of GBS detection.



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