Comparison of culture-based methods for Group B *Streptococcus* detection in screening samples from pregnant women

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Abstract

Background: The Centers for Disease Control and Prevention recommend screening women between 35 and 37 weeks of pregnancy to determine Group B *Streptococcus* (GBS) carrier status and antimicrobial susceptibility testing on GBS isolates from penicillin-allergic women.

Objective: The purpose of this study was to compare LIM broth RambaQuick (6 and 24 hour incubation) subculture to CHROMagars to Carrot broth subculture to Detect.

Methods: A total of 115 vaginal/rectal Eswabs (Copan Diagnostics Inc., Murrieta, CA) submitted for routine prenatal GBS screenings were evaluated by Carrot broth (Hardy Diagnostics, Santa Maria, CA) subculture to GBS Detect (Detect; Hardy Diagnostics, Santa Maria, CA) and LIM RambaQuick Strep B broth (LIM broth, CHROMagar, Paris, France) subculture to CHROMagar Strep B (CHROMagar, Paris, France). Both the Carrot and LIM broths were inoculated with approximately 500 µL of the Eswab modified Liquid Amies transport solution and the swab was placed in the Carrot broth (according to the manufacturer's instructions). All LIM broths and CHROMagars were incubated aerobically, in non CO_2, at 35ºC. Each LIM broth was subcultured to CHROMagar after incubating for 6 hours and 24 hours. CHROMagars were incubated 24 hours and were examined for mauve colonies, which on CHROMagar is characteristic of beta-hemolytic and non-hemolytic GBS. All Carrot broths and Detect agars were incubated aerobically at 35ºC. Carrot broths were incubated for 24 hours and examined for any orange color in the broth, which indicates GBS. GBS negative broths were subcultured to Detect plates. Detect plates were incubated 24 hours and examined for any beta-hemolytic colonies, which on Detect is a characteristic of beta-hemolytic and non-hemolytic GBS. Performance calculations were determined using Carrot broth subculture to Detect as the reference method.

Results: LIM broth (6 hour incubation) subculture to CHROMagar had a sensitivity and specificity of 91.8% and 86.4%, respectively, while LIM broth (24 hour incubation) subculture to CHROMagar had a sensitivity and specificity of 93.9% and 81.8%, respectively.

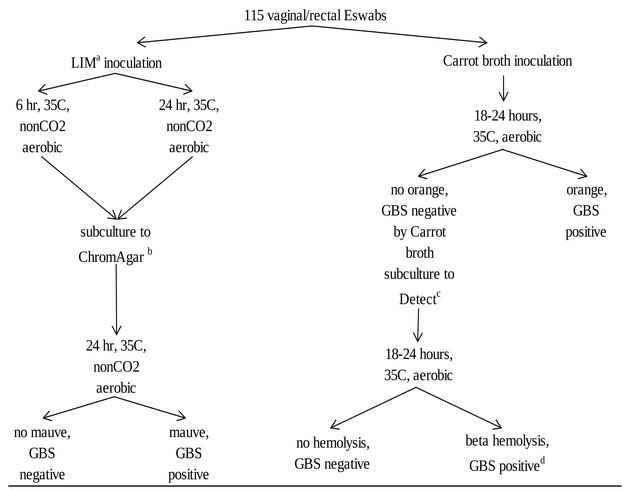
Conclusions: LIM broth subcultures to CHROMagar have high sensitivities and may yield high specificities with confirmation of positive CHROMagars by latex agglutination. The broth incubation time, 6 versus 24 hours, did not appear to affect performance characteristics of LIM broth subculture to CHROMagar.

Introduction

The Centers for Disease Control and Prevention recommend screening women between 35 and 37 weeks of pregnancy to determine GBS carrier status and antimicrobial susceptibility testing on GBS isolates from penicillin-allergic women. We compared LIM RambaQuick Strep B subculture (LIM broth) to CHROMagar Strep B (CHROMagar) to Carrot broth subculture to Detect for the detection and isolation of GBS.

Methods

FIGURE 1. Study design for the evalutation of culture-based methods for detection of Group B *Streptococcus*.



[a] LIM RambaQUICK Strep B.
[b] CHROMagar Strep B.
[c] Detect, GBS Detect Agar.
[d] Confirmed by CAMP or latex agglutination.

Results

A total of 49 of 115 (42.6%) vaginal/rectal specimens were positive for GBS as determined by Carrot broth subculture to Detect. LIM broth (6 hour incubation) subculture to CHROMagar had a sensitivity and specificity of 91.8% and 86.4%, respectively, while LIM broth (24 hour incubation) subculture to CHROMagar had a sensitivity and specificity of 93.9% and 81.8%, respectively (TABLE 1).

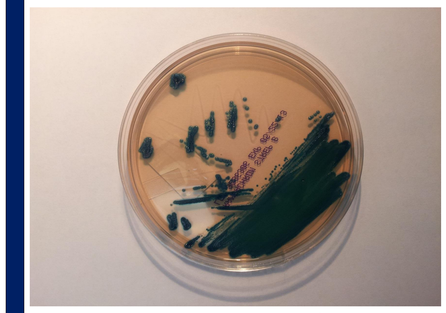


Figure 2. CHROMagar negative for GBS.

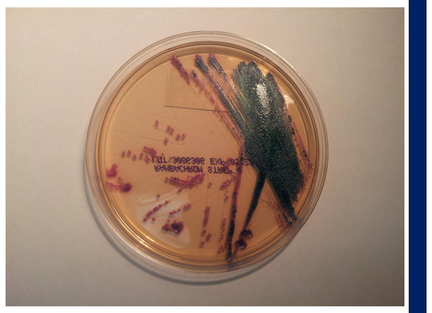


Figure 3. CHROMAGAR positive for GBS.

TABLE 1. Performance of LIM RambaQuick subculture to CHROMagar StrepB compared to Carrot broth subculture to Detect (N=115)

Method	Sensitivity (%) (95% CI)	Specificity (%) (95% CI)	PPV (%) (95% CI)	NPV (%) (95% CI)
LIM RambaQuick (6 hr) subculture to CHROMagar	91.8 (79.5-97.4)	86.4 (75.2-93.2)	83.3 (20.2-91.6)	93.4 (83.3-97.9)
LIM RambaQuick (24 hr) subculture to CHROMagar	93.9 (82.1-98.4)	81.8 (70.0-89.9)	79.3 (66.3-88.4)	94.7 (84.5-98.6)

There were 13 discordant results of LIM broth (6 hour incubation) subculture to CHROMagar and 15 discordant results of LIM broth (24 hour incubation) subculture to CHROMagar when compared to Carrot broth subculture to Detect (TABLE 2).

TABLE 2. Results of LIM RambaQuick subculture to CHROMagar StrepB compared to Carrot broth subculture to Detect

Samples	LIM RambaQuick (6 hr) subculture to CHROMagar	LIM RambaQuick (24 hr) subculture to CHROMagar	Carrot broth subculture to Detect	Final interpretation
45	+	+	+	True positives
50	-	-	-	True negatives
5	+	+	-	False positive LIM RambaQuick (6 and 24 hr) subcultures to CHROMagars*
3	-	-	+	False negative LIM RambaQuick (6 and 24 hr) subcultures to CHROMagars
1	-	+	+	False negative LIM RambaQuick (6 hr) subcultures to CHROMagars
4	+	-	-	False positive LIM RambaQuick (6 hr) subcultures to CHROMagars*
7	-	+	-	False positive LIM RambaQuick (24 hr) subcultures to CHROMagars*

*Positive CHROMagar isolate not GBS as determined by MALDI-TOF.

Conclusions

LIM broth subcultures to CHROMagar have high sensitivities and may yield high specificities with confirmation of positive CHROMagars by latex agglutination or other test.

The broth incubation time, 6 versus 24 hours, did not appear to affect performance characteristics of LIM broth subculture to CHROMagar.