Comparision of Four Media for the Detection of Group A Streptococcus from Throat Specimens

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Abstract

Background: Culture is used commonly for the diagnosis of Group A beta-hemolytic streptococcus (GAS) infections. This study examined medium type and length of incubation for optimal and cost-effective culture of GAS.

Methods: The media included BBL Trypticase Soy with 5% Sheep Blood Agar incubated anaerobically (BAP), Remel Strep A Isolation Agar incubated with 5% Sheep Blood incubated in 5% CO2 (REM), BBL Group A Selective Strep Ager with 5% Sheep Blood incubated in 5% CO2 (BBL), Remel Strep A Isolation Agar incubated in ambient air (or GBSD). A total of 699 throat swabs were cultured. Each specimen was placed into 200 µL of Tissu EDTA buffer and stored for 1 min. Plates were incubated with 25 µl of staphylococci, streaked for isolation using a BD inoculator, incubated at 35°C, and examined at 24 and 48 hours. Beta-hemolytic colonies were tested with Strep-A-Select (Remel, Lenexa, KS) and occasionally with catalase reagent.

Results: A total of 63 GAS isolates were recovered with an overall positivity of 9%. The rates for each medium at 24/48 h were: BAP 54/58 (96%), BBL 45/57 (80%), REM 37/37 (90%), and GBSD 57/57 (90%). Five (8%) isolates were missed by BAP due to low numbers, and 3 (5%) GAS were overgrown. Six (10%) isolates were missed by REM due to a failure to grow. Four (6%) isolates were missed by BBL due to low numbers, and 2 (3%) GAS were missed by GBSD.

Conclusions: GBSD detected the most (90%) isolates after 24 hours. Incubation of GBSD and BAP beyond 24 hours did little to improve the sensitivity (5%) and had a negative impact on specificity (7%). In contrast, the sensitivity of BAP and BBL beyond 24 hours did little to improve the sensitivity of isolation of GAS from swabs. These results are consistent with previous studies, indicating that BAP and BBL, when used alone, may not be the optimal media for the isolation of GAS.

Introduction

Group A beta-hemolytic strep GAS is the most common bacterial agent associated with acute pharyngitis. GAS accounts for as much as 30% of pharyngitis cases in children, with lower rates of incidence in adult populations. Serious complications, including peritonsillar abscess, necrotizing fasciitis, and disseminated gangrene, are associated with GAS infection. Prompt diagnosis is necessary to prevent complications. Selection of the appropriate site of antibiotics and helps to alleviate symptoms and complications. GAS is a Gram-positive coccus that grows best in aerobic conditions; however, some strains require anaerobic conditions for growth. The methods described in this study were selected for their ease of use and minimal cost. The performance of each medium was compared with other media in terms of latex testing for GAS, subcultures required, and the length of incubation needed for the optimal and cost-effective culture of GAS.

Methods

The media included in this evaluation were, BBL Trypticase Soy with 5% Sheep Blood Agar incubated anaerobically (BAP), Remel Strep A Isolation Agar incubated with 5% Sheep Blood incubated in 5% CO2 (REM), and Hardy's GBS Detect agar incubated in ambient air (or GBSD). A total of 699 throat swabs were cultured. Each specimen was placed into 200 µL of Tissu EDTA buffer and stored for 1 min. Plates were incubated with 25 µl of staphylococci, streaked for isolation using a BD inoculator, incubated at 35°C, and examined at 24 and 48 hours. Beta-hemolytic colonies were tested with Strep-A-Select (Remel, Lenexa, KS) and occasionally with catalase reagent.

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Figures 1a-d: The appearance of GAS on each medium. All media were inoculated with the same specimen and incubated for 24 hours.

Figures 1a: BAP (anaerobic)
Figure 1b: BBL Group A Selective Strep Ager (5% CO2)
Figure 1c: Remel Strep A Isolation Agar (5% CO2)
Figure 1d: GBS Detect Agar (aerobic)

Cost Analysis for GAS Culture

<table>
<thead>
<tr>
<th>Medium</th>
<th>Annual Supply &amp; Labor Cost</th>
<th>Latex Testing Needed for non-GAS Beta Hemolytic Colonies</th>
<th>Subculture No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAP</td>
<td>$29,530</td>
<td>5% required latex testing for non-GAS</td>
<td>5%</td>
</tr>
<tr>
<td>GBSD</td>
<td>$21,174</td>
<td>10% required latex testing for non-GAS</td>
<td>10%</td>
</tr>
<tr>
<td>REM</td>
<td>$15,768</td>
<td>10% required latex testing for non-GAS</td>
<td>10%</td>
</tr>
<tr>
<td>BBL</td>
<td>$9,516</td>
<td>10% required latex testing for non-GAS</td>
<td>10%</td>
</tr>
</tbody>
</table>

Conclusion

Hardy’s GBS Detect agar detected the most (90%) isolates after 24 hours. Incubation of BAP and BAP beyond 24 hours yielded marginal improvement in the sensitivity (7%) and had a negative impact on specificity (5%). In contrast, the sensitivity and specificity of GBSD and BAP incubated in ambient air were superior to other media. These results are consistent with previous studies, indicating that BAP and BAP, when used alone, may not be the optimal media for the isolation of GAS.