Evaluation of New bioMérieux Chromogenic CPS Media for Detection of Urinary Tract Pathogens

Josselin Rigaill, Paul O. Verhoeven, Caroline Mahinc, Mohamed Jeraiby, Florence Grattard, Nathalie Fonsale, Bruno Pozzetto, Anne Carricajo

Laboratory of Infectious Agents and Hygiene, University Hospital of Saint-Etienne, Saint-Etienne, France; GIMAP EA 3064 (Groupe Immunité des Muqueuses et Agents Pathogènes), Faculty of Medicine of Saint-Etienne, University of Lyon, Saint-Etienne, France

Four chromogenic media were compared for their ability to detect urinary tract pathogens in 299 urine specimens, of which 175 were found positive, allowing the growth of 279 microorganisms. After 18 to 24 h of incubation, the CPS ID4, CPSE, CPSO (bio-Mérieux), and UriSelect4 (Bio-Rad) media showed sensitivities of 97.1%, 99.3%, 99.6%, and 99.6%, respectively.

It has long been recognized that the use of chromogenic agar plates improves the detection and identification of urinary tract pathogens (1–3) for the diagnosis of urinary infection. However, improvements are still needed to allow an easier differentiation of colonies in mixed culture, enhance the growth rate, and permit the detection of fastidious microorganisms.

Two chromogenic CPS media (bioMérieux) with CPSE (translucent agar) and CPSO (opaque agar) were recently commercialized, with the objectives of increasing the sensitivity of detection of microorganisms and providing results after a shortened incubation period (16 to 18 h instead of 18 to 24 h). The present study reports the performance of these two new CPS media compared with that of the CPS ID4 medium from the same company and the UriSelect4 medium from Bio–Rad.

A total of 299 urine samples were prospectively included in the study between May and July 2014. Clear urine samples were excluded. A 10-μl volume of specimen was plated onto the 4 chromogenic media. All plates were incubated at 36°C under aerobic conditions and then were visually examined after 18 to 24 h of incubation. An intermediate reading was performed at 16 to 18 h to 18 to 24 h. The present study was conducted between May and July 2014. Clear urine samples were excluded. A 10-μl volume of specimen was plated onto the 4 chromogenic media. All plates were incubated at 36°C under aerobic conditions and then were visually examined after 18 to 24 h of incubation. An intermediate reading was performed at 16 to 18 h to 18 to 24 h. The present study reports the performance of these two new CPS media comparatively in this study with that of the CPS ID4 medium from the same company and the UriSelect4 medium from Bio–Rad.

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TABLE 1 Microorganisms detected in urinary specimens on each of the four chromogenic media tested comparatively in this study

<table>
<thead>
<tr>
<th>Microorganism detected (no. of isolates)</th>
<th>No. of microorganisms by incubation time (h) for:</th>
<th>16–24</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UriSelect4</td>
<td>CPSE</td>
</tr>
<tr>
<td>Gram negative (168)</td>
<td>167</td>
<td>168</td>
</tr>
<tr>
<td>Escherichia coli (104)</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Other Enterobacteriaceae (57)</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>Other Gram-negative bacteria (7)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Gram positive (93)</td>
<td>93</td>
<td>91</td>
</tr>
<tr>
<td>Enterococcus spp. (62)</td>
<td>62</td>
<td>61</td>
</tr>
<tr>
<td>Staphylococcus spp. (26)</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Other Gram-positive bacteria (5)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Yeasts (18)</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Total (279)</td>
<td>278</td>
<td>277</td>
</tr>
</tbody>
</table>

a Average of 16.5 h (range, 15.8 to 18.5 h) and 21.5 h (range, 20 to 24 h) for the reading between 16 to 18 h and 18 to 24 h, respectively.

b With 21 Klebsiella pneumoniae, 11 Proteus mirabilis, 4 Citrobacter koseri, 4 Klebsiella oxytoca, 4 Morganella morganii, 4 Proteus vulgaris, 5 Enterobacter cloacae, 2 Serratia marcescens, 1 Hafnia alvei, and 1 Raoultella species.

c P < 0.05, as calculated by comparing each result with the total number of germs obtained on all media by using Fisher’s exact test or chi-square test.
Statistical analyses were performed using the MedCalc statistical software version 14.12.0 (MedCalc Software bvba, Ostend, Belgium). P values of <0.05 were considered statistically significant.

Among the 299 included samples, 88 (29.4%) tested sterile, 16 (5.4%) grew <10^3 CFU/ml of bacteria, and 195 (65.2%) were found positive. Among the positive samples, 131, 50, 8, and 6 yielded 1, 2, 3, and 4 microorganisms, respectively, for a total of 279 microorganisms. With a huge predominance of Enterobacteriaceae (57.7%) (of which 61.9% were E. coli), 33.3% Gram-positive bacteria, and 6.5% yeasts, the study population was representative of the distribution of urinary tract pathogens isolated in hospitals (5, 6).

After 18 to 24 h of incubation, the new CPS media and the UriSelect4 medium showed similar performance, with a sensitivity of 99.3% (277/279) for CPSE and 99.6% (278/279) for CPSO and UriSelect4, whereas the CPS ID4 medium, which exhibited a sensitivity of 97.1% (271/279), was statistically less efficient (P < 0.05). After 16 to 18 h of incubation, the two new CPS media showed a statistically significant decrease in sensitivity (94.6% [264/279] for CPSE and 95.0% [265/279] for CPSO) compared to that observed after 18 to 24 h (P < 0.05), except for Enterobacteriaceae, for which the sensitivity was 98.1% (158/161) at 16 to 18 h (Table 1). As observed in other studies (7–9), Gram-positive bacteria and yeasts exhibited delayed growth on chromogenic media (Table 1) and yielded smaller colonies than those of other species.

As recommended by the two manufacturers, pink to burgundy colonies could be identified as E. coli without needing further analysis. For this agent, a sensitivity of 99.0% was observed with the CPS ID4 medium, and a sensitivity of 98.1% was observed with the three other media; indeed, in one sample, an E. coli strain gave pale brown colonies on all four media, whereas another strain of the same species gave white colonies on all of the media except on the CPS ID4, which exhibited pink colonies. The specificity of the direct identification of E. coli was of 99.1% for the four media, since a strain of Hafnia alvei grew with pink colonies, an observation previously made with the same species (10).

Overall, the two new CPS media are efficient in detecting and identifying urinary tract pathogens. They exhibit an improvement in sensitivity compared to that of the former CPS ID4 medium. At 16 to 18 h, 95% of the urinary pathogens were recovered using the chromID CPS Elite medium, including all E. coli strains, which represents the most frequently isolated species in urinary tract infections. At 18 to 24 h, the recovery rate reaches 99.6% for chromID CPS Elite opaque and 99.3% for chromID CPS Elite translucent. However, in order to avoid missing microorganisms with slower growth, we recommend performing an additional culture of the plates at 18 to 24 h. Further studies with automated reading of cultures would permit an optimal evaluation of the sensitivity of the new media after a shorter incubation period.

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We declare no conflicts of interest related to this study.

REFERENCES