Thermostable DNase Is Superior to Tube Coagulase for Direct Detection of Staphylococcus aureus in Positive Blood Cultures

In a recent edition of the Journal of Clinical Microbiology, Qian et al. described the sensitivity and specificity of the direct tube coagulase (DTC) test for the presumptive identification of *Staphylococcus aureus* directly from positive blood culture bottles from which Gram stains were consistent with staphylococci (7). The reported sensitivities of 34% at 2 h of incubation and 65% at 4 h of incubation (7) are considerably lower than those previously described and suggest an unacceptably high rate of false negatives (1, 4, 5, 6, 8, 9, 11). The authors draw the conclusion that despite its low sensitivity the DTC test is clinically valuable, particularly in experienced hands, because of its low cost and simplicity (7).

However, Qian et al. neither evaluated nor commented on the use of the thermostable DNase test for the presumptive identification of *S. aureus* directly from positive blood culture bottles, as described by Madison and Baselski (4) and others (1, 6, 8, 9, 10). In these studies, the thermostable DNase test has been reported to be sensitive (85% to 100%) and specific (93 to 100%), to have a high degree of correlation with the DTC test (92.7 to 100%), to be relatively simple to perform, and to have low material cost (1, 4, 6, 8, 9, 10). In our laboratory, the material cost per test is 79¢, compared to 22¢ for the DTC test. Furthermore, the thermostable DNase test has the advantage of having a more rapid turn-around time than the DTC test, often being positive at 1 h (4, 8).

We recently compared the thermostable DNase test with the DTC test for the presumptive identification of *S. aureus* from Bact/Alert (bioMérieux, Marcy l’Étoile, France) blood culture bottles in two tertiary-care teaching hospitals over a period of 50 days. The DTC test was performed by mixing 50 μl of positive blood culture broth with 450 μl of rabbit plasma (Becton Dickinson, Oakville, Ontario, Canada) in a glass test tube and incubating at 37°C. The thermostable DNase test was performed using the agar diffusion method. A 2-ml aliquot of blood culture broth was boiled for 15 min and then cooled to room temperature. Six-millimeter holes were cut in toluidine blue DNase agar plates produced according to the method of Elder (2). Of 81 positive blood culture bottles from unique patients with initial Gram stains showing gram-positive cocci in clusters, the DTC test demonstrated a sensitivity of 56.7% at 2 h and 93.3% at 4 h while the thermostable DNase test had a sensitivity of 96.7% at 2 h and 100% at 4 h (Table 1). The specificity for both methods was 100% at both 2 and 4 h.

Based on our findings, we propose that although the DTC test used with Bact/Alert blood culture bottles has an acceptable sensitivity at 4 h (93.3%), the thermostable DNase test is more rapid, has greater sensitivity, and is nearly as simple and affordable as the DTC test and should be the test of choice for the rapid diagnosis of *S. aureus* from positive blood culture bottles with initial Gram stains showing gram-positive cocci in clusters. Although our study is small, it does underscore two important points: first, that the DTC test may have variable sensitivities depending on the operator and the culture system used, which Qian et al. have suggested, and second, that simple rapid tests such as the thermostable DNase test are reliable, easily interpreted, accurate, and potentially more useful than the DTC test.

The technical expertise of the technologists who performed the testing at Saint Boniface General Hospital and the Health Sciences Centre is gratefully acknowledged.

### REFERENCES


### TABLE 1. Comparison of thermostable DNase and DTC tests

<table>
<thead>
<tr>
<th>Presumptive identification test</th>
<th>Incubation time (h)</th>
<th>No. of samples positive for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>S. aureus</em> (n = 30)</td>
<td>Coagulase-negative staphylococci (n = 51)</td>
</tr>
<tr>
<td>Thermostable</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>DNase test</td>
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<td>30</td>
</tr>
<tr>
<td>DTC test</td>
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<td>17</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>28</td>
</tr>
</tbody>
</table>

* Comparison of the sensitivities, specificities, PPV, and NPV for positive blood cultures from 81 unique patients with initial Gram stains showing gram-positive cocci in clusters.


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