Evaluation of MicroScan Rapid Pos Combo Panels for Identification of Staphylococci

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MicroScan Rapid Pos Combo panels (Baxter Diagnostics, Inc., MicroScan, West Sacramento, Calif.) contain substrates conjugated with fluorophores and substrates with a fluorescent pH indicator. AutoSCAN W/A, an automated panel processor equipped with a fluorometer, reads the panels after 2 h of incubation and can identify staphylococci to the species level. We tested 239 strains belonging to 17 species of staphylococci. All the strains were identified by conventional methods (W. E. Kloos and K. H. Schleifer, J. Clin. Microbiol. 1:82–88, 1975) and by the MicroScan Rapid ID system. The system correctly identified 219 (91.6%) strains; nine (3.8%) identification results were probably correct, and six (2.5%) results were incorrect. The system designated five (2.1%) strains as rare biotypes. The automated MicroScan Rapid ID system is useful and reliable in identifying most human isolates of staphylococci encountered in the clinical laboratory.

MATERIALS AND METHODS

In total, 239 staphylococci were tested. Species names and the number of isolates included in the study are listed in Table 1. Strains were selected to include all the staphylococcal species isolated in our laboratory in the previous year. An effort was made to include 10 or more strains of the most frequently occurring species. Acceptability of reactions was checked by testing the recommended MicroScan Control strains (AmMS) for identification with each run. The results of each run were considered valid when the AmMS control strains produced the expected reactions and the following American Type Culture Collection strains were correctly identified: Staphylococcus aureus ATCC 25923; Staphylococcus epidermidis ATCC 14990; Staphylococcus hominis ATCC 29970; Staphylococcus chromogenes ATCC 29974; Staphylococcus hominis ATCC 27844; Staphylococcus warneri ATCC 27836; Staphylococcus sciuri ATCC 29062; and Staphylococcus intermedius ATCC 29663.

All strains were isolated from clinical sources. Isolates were grown on Trypticase soy agar (BBL Microbiology Systems) supplemented with 5% horse blood at 35°C for 18 to 24 h. Working cultures were maintained on horse blood slants and were transferred every 6 weeks. Identification of isolates as Staphylococcus species was confirmed by Gram stain, acid production from glycerol in the presence of erythromycin (0.4 µg/ml) (16), and catalase production tests. All the strains were identified in batches first by the conventional methods and then by the MicroScan system.

MicroScan system. MicroScan Rapid Pos Combo Panel Type 1 contains 34 substrate wells, 1 thymidine-free well, and 1 oxazolin growth well for the identification of members of the families Micrococccaeae and Streptococcusaeae. Twenty-two of the 34 substrate wells hold metabolic moiety conjugated with fluorophores, 12 with 4-methylumbelliferone and 10 with 7-amido-4-methylcoumarin. Another 12 wells contain various carbohydrates and urea along with a fluorescent pH indicator, 4-methylumbelliferone.

Panels were removed from storage (4°C) and allowed to equilibrate to room temperature. Panels were inoculated according to the instructions of the manufacturer. Four or five isolated colonies from an 18 to 24 h BA purity plate were...
TABLE 1. Performance of MicroScan Rapid Pos Combo Type 1 panels

<table>
<thead>
<tr>
<th>Staphylococcus species (no. of strains tested)</th>
<th>No. of identifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correcta</td>
</tr>
<tr>
<td>S. auricularis (2)</td>
<td>2</td>
</tr>
<tr>
<td>S. aureus (18)</td>
<td>18</td>
</tr>
<tr>
<td>S. capitis (21)</td>
<td>1</td>
</tr>
<tr>
<td>S. caprae (1)</td>
<td>1</td>
</tr>
<tr>
<td>S. cohnii (10)</td>
<td>8</td>
</tr>
<tr>
<td>S. epidermidis (40)</td>
<td>38</td>
</tr>
<tr>
<td>S. haemolyticus (20)</td>
<td>20</td>
</tr>
<tr>
<td>S. hominis (20)</td>
<td>14</td>
</tr>
<tr>
<td>S. hyicus (3)</td>
<td>3</td>
</tr>
<tr>
<td>S. intermedius (3)</td>
<td>3</td>
</tr>
<tr>
<td>S. lugdunensis (14)</td>
<td>13</td>
</tr>
<tr>
<td>S. saprophyticus (28)</td>
<td>27</td>
</tr>
<tr>
<td>S. schleiferi (8)</td>
<td>8</td>
</tr>
<tr>
<td>S. sciuri (6)</td>
<td>6</td>
</tr>
<tr>
<td>S. simulans (8)</td>
<td>7</td>
</tr>
<tr>
<td>S. warneri (25)</td>
<td>24</td>
</tr>
<tr>
<td>S. xylosus (12)</td>
<td>9</td>
</tr>
</tbody>
</table>

Total (%) 239 219 (91.6) 9 (3.8) 6 (2.5) 5 (2.1)

a The correct identification of the species was the first or the only option, and the identification probability was >85%.

b The correct species was one of the choices, and none of the species listed achieved identification probability of 85%.

c Either a wrong species was the first or only choice with 85% identification probability, or the correct species was not listed and none of the listed identifications reached a probability of 85%.

d The MicroScan system was unable to identify the strain.

touched and emulsified in 6.5 ml of 0.4% saline with a surfactant, Phuronic P 104 (BASF, Parsippany, N.J.). The final turbidity was adjusted to 0.5 McFarland barium sulfate standard. The suspension was vortexed. Rapid Pos Inoculum Broth was inoculated with 300 µl of bacterial suspension. Panels were rehydrated and inoculated with the inoculum broth by using the MicroScan Renok Rehydrator/Inoculator system. The system delivers 115 ± 10 µl of broth suspension to each well. Each panel was tagged with an autoSCAN W/A bar code label and inserted into an empty slot of the autoSCAN W/A.

The autoSCAN W/A equipped with a fluorometer reads the identification substrates twice during 2 h and registers the changes in the intensity of fluorescence in each individual well. These changes indicate positive or negative reactions. The autoSCAN W/A software converts the results into a 15-digit biotype number and compares it with a built-in database. The MicroScan Data Management System and the autoSCAN W/A software include probability tables used in the identification of an isolate.

Conventional identification. All isolates included in this study were identified by the conventional methods using partitioned quadrant plates as outlined previously (5, 12, 14). For the purpose of this study the results of the conventional system were considered correct.

RESULTS

A total of 239 strains including 17 species of staphylococci were tested. Of the tested strains, 219 (91.6%) were correctly identified, 9 (3.8%) were probably correct, and 6 (2.5%) were misidentified. The MicroScan system failed to identify five (2.1%) strains, which were classified as rare biotypes. Misidentified strains of Staphylococcus capitis and S. warneri were designated as Staphylococcus auricularis and Staphylococcus saprophyticus, respectively. Two strains of Staphylococcus hominis and one strain of Staphylococcus xylosus were misidentified as S. warneri. In each case, one discrepant reaction was responsible for misidentification. The discrepant phenotype reaction varied for each misidentified strain. In all instances, misidentified strains were positive for a reaction that was negative for all the correctly identified isolates of that species. Details of the results are shown in Table 1. All the identification results were complete after 2 h.

DISCUSSION

The MicroScan Rapid ID system was able to identify 228 of 239, or 95.4%, of the organisms tested, though 9 of 228 organisms could be identified to the species level only after additional tests. The number of erroneous identifications was low, and only 6 of 239 strains were placed in the incorrect category. From clinical material, S. epidermidis, S. saprophyticus, S. xylosus, S. haemolyticus, S. capitis, S. cohnii, S. warneri, Staphylococcus simulans, and S. hominis are the most commonly isolated species of coagulase-negative staphylococci (6). Of these frequently occurring species, 94% of the strains could be correctly designated with or without supplementary tests, and only 3.2% of the results were incorrect. Our results with the MicroScan Rapid ID system are very similar to those recently published by Kloos and George (11). Although the identification results with this system are available after only 2 h of incubation, susceptibilities may require up to 15 h of incubation (data not shown). Since some species of coagulase-negative staphylococci are more likely to be multiply resistant than others (13), early identification of species may be helpful in the management of patients.

Most commercially available kits based on conventional methods require overnight incubation. The Vitek GPI card system assisted by an automated module can identify some strains of staphylococci as early as 4 h (15).

With the advent of identification systems that rely on the detection of preformed enzymes and use substrates that cannot be used in the conventional identification methods, it has become possible to achieve same-day identification. Such identification kits have been on the market for some time and have been successfully employed for identifying many organisms, including Staphylococcus species (10).

The accuracy of all commercially available systems for the identification of staphylococci varies considerably among published studies. Generally, most systems can identify S. epidermidis and S. saprophyticus strains reliably. Identification of other staphylococcal species is less accurate (15). The accuracy of identifying staphylococcal species that are not identified with high accuracy varies from system to system. Published rates of correct identification for various systems have been from 67 to 95% (15). Different mixes of staphylococcal species and the use of supplementary tests by some investigators may partly explain such a great variation. In some cases, accuracy of identification may also be strain dependent (10, 15). The rates of identifications for staphylococcal species in our study with MicroScan Rapid Pos Combo panels were equal to if not better than published rates.

As mentioned earlier, the kits with chromogenic substrates provide rapid results. A disadvantage of these kits has been the occasional difficulty in interpretation of color reactions. Introduction of the MicroScan Rapid Pos Combo
panels has alleviated this specific problem. The system uses fluorogenic rather than chromogenic substrates, and fluorometry is also more sensitive than colorimetry (6). The disadvantage is that the panels cannot be evaluated visually and require the autoSCAN W/A.

On the whole, MicroScan Rapid Pos Combo panels proved to be very useful and reliable in identifying Staphylococcus species of human origin. The fact that the identification results are available within 2 h is an added benefit.

ACKNOWLEDGMENT

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REFERENCES


