Identification of *Staphylococcus* Species with the VITEK 2 System: the Case of *Staphylococcus hominis*

We read with interest the paper by Layer et al. regarding the identification of staphylococci with automated systems including VITEK-2 (bioMérieux, Marcy l’Etoile, France) (6). Of 86 strains analyzed in their study, 4 were *Staphylococcus hominis* and all were correctly identified by the colorimetric ID-GP VITEK-2 cards. Identical results have been reported in recent studies evaluating 13 and 14 *S. hominis* isolates (3, 7).

Two *S. hominis* subspecies exist—subspecies *hominis* and subspecies *novobiosepticus*—which may be differentiated according to novobiocin susceptibility (5). *S. hominis* subs. *hominis* is more common in clinical samples, but *S. hominis* subs. *novobiosepticus* has recently been shown to cause bacteremia among neonates (1). VITEK-2 actually identifies *S. hominis* with “low discrimination,” and performance of manual novobiocin susceptibility testing is advised by the manufacturer in order to differentiate *S. hominis* subs. *hominis* and *S. hominis* subs. *novobiosepticus*. Thus, it would be interesting to know what subspecies were used by Layer et al. and whether the system performed similarly with both subspecies.

Interestingly, novobiocin resistance testing is one of 43 reactions carried out by the ID-GP card. While a negative result may represent susceptibility but also early termination of the reaction, it is tempting to regard a positive reaction as suggestive of *S. hominis* subs. *novobiosepticus*. We studied nonduplicate consecutive clinical isolates of *S. hominis* and *S. epidermidis* (15 each) identified by VITEK-2. *S. epidermidis* was chosen as the control since it is almost always novobiocin susceptible (4). Isolates were processed by using VITEK-2 according to the manufacturer’s instructions. Isolates were inoculated onto cation-adjusted Mueller-Hinton agar (Hy-Labs, Rehovot, Israel) according to Clinical Laboratory Standards Institute guidelines (2) and tested with a 5-μg novobiocin disk (BBL, BD Diagnostic Systems, Cockeysville, MD). A zone-of-inhibition diameter of ≤15 mm was considered to indicate resistance (5). Quality control was monitored using *S. aureus* ATCC 29213.

According to VITEK-2, of 15 *S. hominis* isolates, 5 (33.3%) were resistant to novobiocin, 8 were susceptible, and 2 yielded an indeterminate result. Of 15 *S. epidermidis* isolates, 3 (20%) were novobiocin resistant and 12 (80%) were susceptible. However, by disk diffusion, all isolates of both species were novobiocin susceptible. The mean zone-of-inhibition diameter for the eight isolates that were novobiocin resistant by VITEK-2 was 34.5 mm overall (range, 26 to 43 mm), and that for *S. hominis* was 31.8 ± 3.1 mm (range, 26 to 36 mm), and that for *S. epidermidis* was 36.8 ± 3.2 mm (range, 33 to 43 mm; P <0.001 by the Kruskal-Wallis test). The mean zone diameter for the 20 susceptible strains (P = 0.98). Results were similar when *S. hominis* and *S. epidermidis* were analyzed separately.

Novobiocin susceptibility results from the VITEK-2 ID-GP cards do not correlate well with disk diffusion results, and manual testing is indeed warranted for differentiating *S. hominis* subs. *hominis* and *S. hominis* subs. *novobiosepticus*. Resolving the low-discrimination result obtained with *S. hominis* is of even greater value given that *S. hominis* subs. *novobiosepticus* is not included in the VITEK-2 advanced expert system knowledge base and, therefore, therapeutic corrections are not suggested for *S. hominis* subs. *novobiosepticus*. Given all of the above, we believe that in future studies evaluating the performance of automated systems with coagulase-negative staphylococci, the issue of *S. hominis* subs. *hominis* and *S. hominis* subs. *novobiosepticus* differentiation should receive more emphasis.

REFERENCES

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Authors’ Reply
We read the letter by Gilad and Schwartz regarding our publication (4), and we are glad to comment on their observations about the species *Staphylococcus hominis* subs. *hominis* and *S. hominis* subs. *novobiosepticus*. In our strain collection for the publication (4), we analyzed four *S. hominis* strains. Identification by VITEK-2 revealed *S. hominis* without identification to the subspecies level. But the confidence level for the species identification was 99%. The two *S. hominis* subspecies—subspecies *hominis* and subspecies *novobiosepticus*—can be differentiated according to novobiocin susceptibility. Therefore, we identified to the subspecies level the respective *S. hominis* strains and six additional clinical isolates of *S. hominis* (n = 10) by using novobiocin susceptibility testing and one reference strain of *S. hominis* subs. *hominis* (CCM2732). Additionally, as a control for novobiocin susceptibility, we tested 12 clinical isolates of *S. epidermidis* as novobiocin sensitive (2) and one reference strain of *S. saprophyticus* subs. *saprophyticus* as novobiocin resistant (2). Isolates were inoculated onto Mueller-Hinton agar (Oxoid Ltd., Basingstoke,
Hampshire, England) according to Clinical Laboratory Standards Institute guidelines (1) and tested with a 5-µg novobiocin disk (Oxoid, Basingstoke, Hampshire, England). A zone-of-inhibition diameter of \( \leq 15 \) mm was considered to indicate resistance (3).

We did not observe novobiocin resistance in all \( S. \) hominis strains tested, including the reference control strain of \( S. \) hominis subsp. hominis. The clinical control strains of \( S. \) epidermidis were all novobiocin sensitive, and the reference control strain of \( S. \) saprophyticus subsp. saprophyticus was novobiocin resistant by the disk diffusion test (Table 1).

Novobiocin resistance testing is one of 43 reactions carried out by the GP card of the VITEK-2 system. All isolates were processed by using VITEK-2 according to the manufacturer’s instructions. In our hands, novobiocin susceptibility results from the VITEK-2 ID-GP card correlated with disk diffusion results by manual testing.

So far, in our clinical setting we have not observed any occurrence of \( S. \) hominis subsp. novobiosepticus, but in future studies we will look out for the issue of the subspecies differentiation for \( S. \) hominis.

### REFERENCES


### TABLE 1. Novobiocin susceptibility test and identification results from VITEK-2

<table>
<thead>
<tr>
<th>Strain(s)</th>
<th>No. of isolates</th>
<th>Result from VITEK-2 (ID-GP card)(^a)</th>
<th>Result from novobiocin disk diffusion test(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S. ) hominis clinical isolates</td>
<td>10</td>
<td>NOVO−</td>
<td>20.70 ± 1.89</td>
</tr>
<tr>
<td>( S. ) hominis subsp. hominis</td>
<td>1</td>
<td>NOVO−</td>
<td>22.00</td>
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<tr>
<td>CCM 2732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S. ) epidermidis clinical isolates</td>
<td>12</td>
<td>NOVO−</td>
<td>21.75 ± 1.48</td>
</tr>
<tr>
<td>( S. ) saprophyticus subsp. saprophyticus CCM 883</td>
<td>1</td>
<td>NOVO+</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^a\) NOVO−, novobiocin susceptible; NOVO+, novobiocin resistant.

\(^b\) Zone-of-inhibition diameters (in millimeters) and, for the clinical isolates, mean zone-of-inhibition diameters ± standard deviations are given.

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