

Efficiency of the New Microgen® Staph ID for the Identification of Medically Important *Staphylococcus* spp.

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Introduction

Although the most commonly encountered species of *Staphylococcus* in human disease is *S. aureus*, the importance of coagulase-negative staphylococci (CNS) as significant pathogens in human illness has increased significantly over the last decade. Prior to this, *S. epidermidis*, *S. saprophyticus* and *S. haemolyticus* were the only species considered to be of clinical significance. More recently, *S. capitis*, *S. hominis*, *S. lugdunensis*, *S. warneri*, *S. saccharolyticus* and *S. xylosus* have also emerged as significant opportunistic pathogens, particularly associated with immunocompromised patients (1,2). The ability of laboratories to simply and accurately identify the individual species of CNS enables laboratories to investigate the incidence and significance of these species more effectively.

Microgen® Staph ID, (Microgen Bioproducts, UK) is a simple biochemical identification system based on 13 substrates plus 2 routinely performed external tests (Table 1) for the identification of 32 species of *Staphylococcus* or closely related clinically important species (Table 2). The Microgen® Staph ID system is supported by the Microgen® Identification System Software to assist in the interpretation of the results achieved. The database included in this software is extensive and the taxonomy employed is current.

The performance of the Microgen® Staph ID was compared with the API Staph identification system from BioMerieux (France).

Sucrose Fermentation
Trehalose Fermentation
Mannitol Fermentation
N-Acetyl Glucosamine Fermentation
Mannose Fermentation
Turanose Fermentation
Alkaline Phosphatase
Glucosidase
Glucuronidase/ Nitrate Reduction
Urease Production
Arginine Dihydrolase
PYR
Coagulase/ Latex Agglutination
Colony Pigment

Table 1. Substrates and other tests included in the Microgen Staph ID

Materials and Methods

Bacterial Strains

A total of 108 isolates of *Staphylococcus* spp. comprising both cultures from recognized culture collections and fully characterized clinical isolates obtained from major hospital laboratories in the United Kingdom (Table 3) were examined. All cultures were maintained in the –80°C culture collection prior to use in this investigation. Prior to investigation, all cultures were subcultured onto sheep blood agar plates and incubated for 18–24 hours at 37°C.

Identification

Both kits under evaluation employ similar inoculation techniques. A single colony of each isolate was inoculated into the suspension medium supplied with each kit. Using sterile pasteur pipettes, approximately 100µl (3 drops) of the organism suspension was inoculated into each well of the Microgen® Staph ID (Figure 1). The API Staph was inoculated in accordance with the manufacturers instructions. After inoculation, each system was incubated at 37°C for 18–24 hours (Figure 2.). Following incubation, both identification systems were read in accordance with the manufacturers instructions. All results were recorded on the work sheets provided and interpreted using the database systems provided for each system.

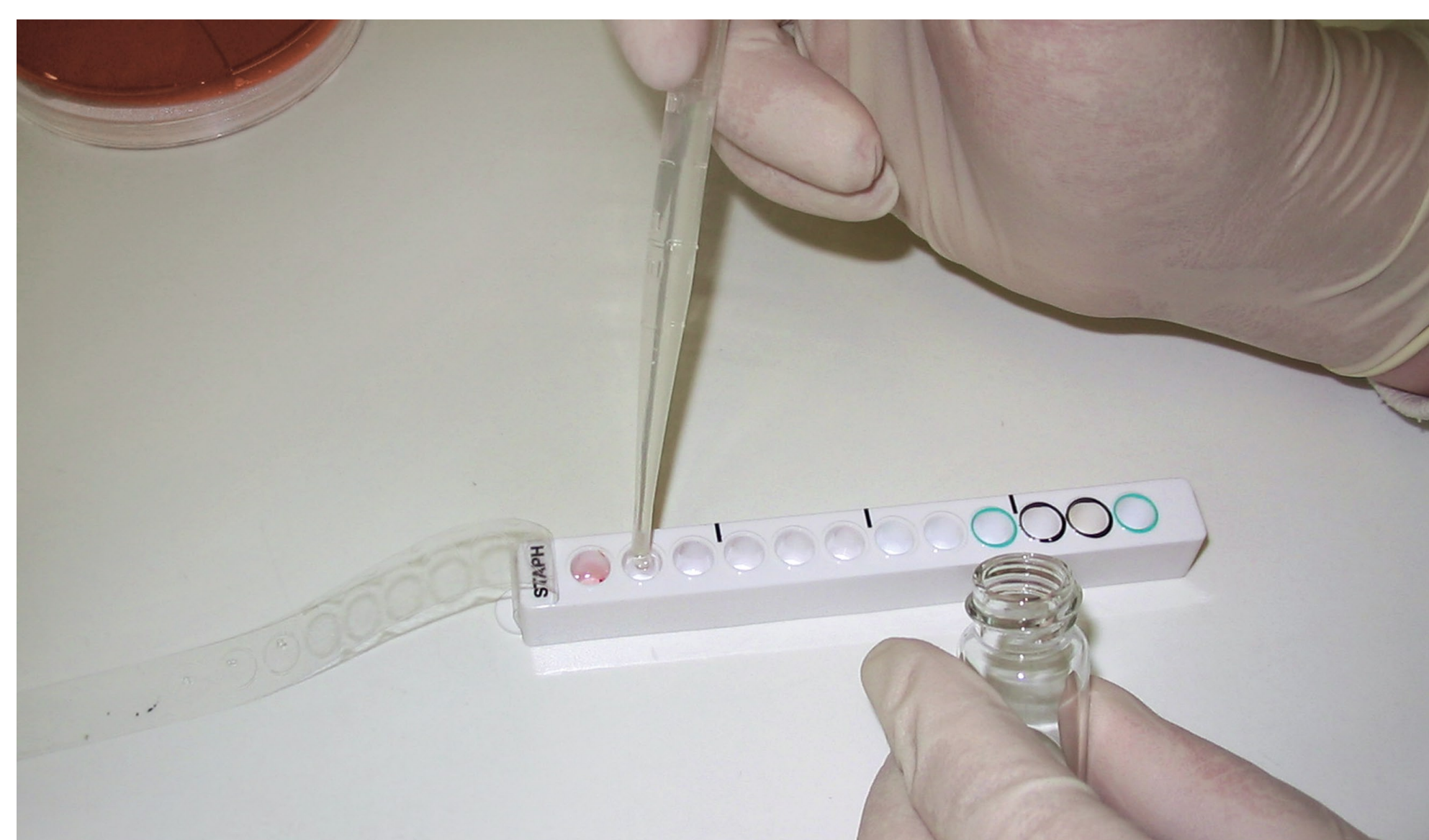


Figure 1. Inoculation of Microgen® Staph ID

<i>Staphylococcus</i> spp.	
<i>S. aureus</i> subsp <i>aureus</i>	<i>S. hominis</i> subsp <i>novobiosepticus</i>
<i>S. aureus</i> subsp <i>anaerobius</i>	<i>S. hyicus</i>
<i>S. auricularis</i>	<i>S. intermedius</i>
<i>S. caprae</i>	<i>S. lentus</i>
<i>S. capitis</i> subsp <i>capitis</i>	<i>S. lugdunensis</i>
<i>S. capitis</i> subsp <i>urealyticus</i>	<i>S. saccharolyticus</i>
<i>S. carnosus</i>	<i>S. saprophyticus</i>
<i>S. chromogenes</i>	<i>S. schleiferi</i> subsp <i>schleiferi</i>
<i>S. cohnii</i> subsp <i>cohnii</i>	<i>S. schleiferi</i> subsp <i>coagulans</i>
<i>S. cohnii</i> subsp <i>urealyticum</i>	<i>S. sciuri</i>
<i>S. epidermidis</i>	<i>S. simulans</i>
<i>S. haemolyticus</i>	<i>S. warneri</i>
<i>S. hominis</i> subsp <i>hominis</i>	<i>S. xylosus</i>
<i>Kocuria</i> spp.	
<i>K. kristinae</i>	<i>K. carniphila</i>
<i>K. rosea</i>	
<i>Kytococcus</i> spp.	
<i>Ky. sedentarius</i>	
<i>Micrococcus</i> spp.	
<i>M. luteus</i>	<i>M. lylae</i>

Table 2. Species of *Staphylococcus* identified using Microgen Staph ID

The coagulase/latex reaction required for the Microgen® Staph ID identification was performed using the Microscreen Staph (M43) from Microgen Bioproducts.

Results

A total of 108 isolates were examined using both identification systems (Table 3) The Microgen® Staph ID confirmed the identity of 107 (99%), whilst the API Staph also confirmed the identity of 107 (99%) of the isolates tested (Table 4). The Microgen® Staph ID was unable to correctly identify 1 strain of *S. haemolyticus* and the API was unable to identify one strain of *S. xylosus*.

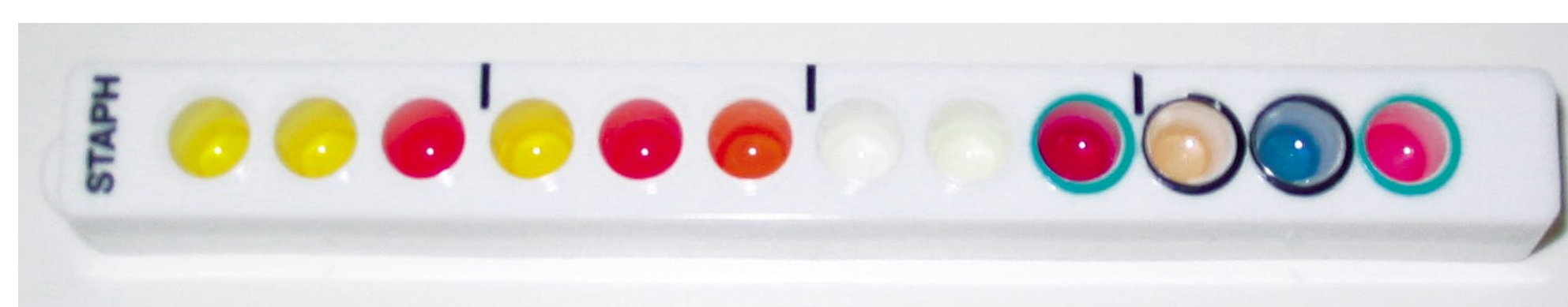


Figure 2. Microgen® Staph ID after incubation and addition of reagents

Discussion

The results of this investigation demonstrates that the Microgen® Staph ID employing 15 substrate reactions was able to accurately identify a wide range of species of *Staphylococcus*. with the same degree of accuracy as the API Staph which employed 20 specific substrate reactions plus the Lysostaphin test (not supplied).

The key features of the Microgen® Staph ID include the use of a coagulase/ latex test, a routinely performed test, which clearly separates *S. aureus* from the coagulase negative species and the inclusion of the PYR test which has been demonstrated to be important in the differentiation of these species. The API Staph employed 20 substrates, of which 5 provided very little if any differentiation of the species being identified. In addition, for full identification using this system the performance of a Lysostaphin test is required. This test is not supplied with the identification system and no direction was provided on how this test should be performed. The provision of a database containing all medically recognised and relevant *Staphylococcal* species with current taxonomy and the careful selection of those tests and substrates most appropriate to the identification of these species has enabled Microgen Bioproducts to develop an extremely efficient and easy-to-use identification system for the identification of these organisms.

	Total Tested
<i>S. aureus</i>	45
<i>S. epidermidis</i>	19
<i>S. haemolyticus</i>	12
<i>S. simulans</i>	8
<i>S. capitis</i> subsp <i>capitis</i>	3
<i>S. capitis</i> subsp <i>urealyticus</i>	2
<i>S. warneri</i>	5
<i>S. saprophyticus</i>	2
<i>S. lugdunensis</i>	2
<i>S. chromogenes</i>	2
<i>S. hominis</i>	3
<i>S. cohnii</i> subsp <i>cohnii</i>	1
<i>S. lentus</i>	1
<i>S. xylosus</i>	1
<i>S. caprae</i>	1
<i>S. auricularis</i>	1
Total	108

Table 3. Isolates identified using Microgen® Staph ID and the API Staph

	Total Tested	MID-69	API Staph
<i>S. aureus</i>	45	45	45
<i>S. epidermidis</i>	19	19	19
<i>S. haemolyticus</i>	12	11	12
<i>S. simulans</i>	8	8	8
<i>S. capitis</i> subsp <i>capitis</i>	3	3	3
<i>S. capitis</i> subsp <i>urealyticus</i>	2	2	2
<i>S. warneri</i>	5	5	5
<i>S. saprophyticus</i>	2	2	2
<i>S. lugdunensis</i>	2	2	2
<i>S. chromogenes</i>	2	2	2
<i>S. hominis</i>	3	3	3
<i>S. cohnii</i> subsp <i>cohnii</i>	1	1	1
<i>S. lentus</i>	1	1	1
<i>S. xylosus</i>	1	1	0
<i>S. caprae</i>	1	1	1
<i>S. auricularis</i>	1	1	1
Total	108	107	107

Table 4. Summary of Microgen ID Staph and API Staph identification results

References

- Schnitzler, N., Meilicke, R., Conrads, G., Frank, D. & Haase, G. (1997). *Staphylococcus lugdunensis*: report of a case of peritonitis and easy-to-perform screening strategy. *J Clin Microbiol* 36, 812-813.
- Kloos, W. E. & Bannerman, T. L. (1994). Update on medical significance of coagulase-negative staphylococci. *Clin Microbiol Rev* 7, 117-140.