

Evaluation of *Brilliance* Staph 24 Agar For Detection of Staphylococci In A Clinical Setting

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Overview

Purpose: The aim of this study was to evaluate the use of Thermo Scientific™ *Brilliance*™ Staph 24 Agar (Thermo Fisher Scientific) for detection of coagulase positive staphylococci from wound swabs in a clinical setting.

Methods: Wound swabs were inoculated onto *Brilliance* Staph 24 Agar, SASelect™ Agar (BioRad Laboratories) and CBA. Post-incubation, any presumptive staphylococci colonies were confirmed using routine laboratory methods, including MALDI-TOF and cefoxitin antimicrobial sensitivity testing (AST).

Results: *Brilliance* Staph 24 Agar detected more coagulase positive staphylococci within 24 hr. incubation than SASelect Agar, compared to the routine laboratory method using SASelect Agar and Columbia Blood Agar incubated for up to 48 hr.

Introduction

Staphylococcus aureus causes systemic infections and a range of skin and soft-tissue infections (SSTIs), such as surgical site infections, abscesses, carbuncles, and boils¹. *S. aureus* is an important cause of serious, invasive and healthcare-associated infections worldwide. In high-income countries, it remains a leading cause of community and nosocomial bacteraemia, associated with mortality rates of 20%-50% and large economic burdens².

Brilliance™ Staph 24 Agar (figure 1) is a selective and diagnostic chromogenic medium for the isolation and enumeration of coagulase-positive staphylococci.

Brilliance Staph 24 Agar was compared to a leading UK hospital laboratory's routine method for detection of *S. aureus* from wound swabs involving culture onto SASelect Agar and Columbia Blood Agar (CBA) (Thermo Fisher Scientific).

Methods

Five hundred and fifty eight wound swabs submitted to the wound bench at Royal Liverpool and Broadgreen University Hospitals NHS Trust were inoculated onto *Brilliance* Staph 24 Agar, SASelect Agar and CBA using the Kiestra™ Inoqua™ total laboratory automation system (Kiestra Lab Automation BV). Swabs consisted of priority (e.g. surgical wounds, fluids and abscesses) and non-priority (e.g. general wounds and leg ulcers) types.

Brilliance Staph 24 Agar was incubated at 37±1°C for 24 hr. Any blue colonies on *Brilliance* Staph 24 Agar were confirmed using Thermo Scientific™ Staphylect Plus™ (Thermo Fisher Scientific) then MALDI-TOF (Bruker). Any *S. aureus* were followed up with cefoxitin AST and Oxoid penicillin binding protein (PBP2') latex agglutination test (Thermo Fisher Scientific). SASelect Agar and CBA were incubated at 37±1°C for 24-48 hr. Pink-orange colonies on SASelect Agar and typical staphylococci colonies on CBA were confirmed using MALDI-TOF and cefoxitin AST according to routine laboratory methods.

FIGURE 1. Coagulase positive staphylococci on *Brilliance* Staph 24 Agar



Performance (sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV)) of the three media was calculated using the laboratory routine method for staphylococcus detection as the reference method. Agreement (positive percentage agreement, negative percentage agreement and overall agreement) of results from *Brilliance* Staph 24 Agar was also compared with that from SASelect Agar.

Results

Brilliance Staph 24 Agar isolated coagulase positive staphylococci from 30% of all wound swabs tested; MRSA were isolated from 11% of these swabs.

Performance of *Brilliance* Staph 24 Agar, SASelect Agar and CBA is summarised in table 1.

TABLE 1. Performance of *Brilliance* Staph 24 Agar, SASelect Agar and CBA

Performance	<i>Brilliance</i> Staph 24 Agar	SASelect Agar	CBA
Sensitivity (%)	95.5 (95% CI = 93.8-97.2)	83.2 (95% CI = 80.1-86.3)	96.1 (95% CI = 94.5-97.7)
Specificity (%)	98.1 (95% CI = 97.0-99.2)	100 (95% CI = 100)	100 (95% CI = 100)
PPV (%)	95.5 (95% CI = 93.8-97.2%)	100 (95% CI = 100)	100 (95% CI = 100)
NPV (%)	98.1 (95% CI = 93.8-97.2%)	92.7 (95% CI = 90.5-94.9)	98.2 (95% CI = 97.1-99.3)

Sensitivity of *Brilliance* Staph 24 Agar was statistically significantly higher than SASelect Agar (P = 0.0002). NPV of *Brilliance* Staph 24 Agar was also higher than SASelect Agar. Specificity of *Brilliance* Staph 24 Agar was comparable to SASelect Agar whereas the PPV was slightly lower.

Although *Brilliance* Staph 24 Agar showed growth of blue colonies that were confirmed as coagulase negative staphylococci or *Corynebacterium* species from 8 swabs (1% of all swabs tested), the plate did detect considerably (12%) more coagulase positive staphylococci than SASelect Agar.

Agreement of *Brilliance* Staph 24 Agar with SASelect Agar is summarised in table 2.

TABLE 2. Agreement of *Brilliance* Staph 24 Agar with SASelect Agar

Positive % agreement	98.8 (95% CI = 97.9-99.7)
Negative % agreement	94.2 (95% CI = 92.3-96.1)
Overall % agreement	95.5 (95% CI = 93.8-97.2)

Staphylococci colonies observed on *Brilliance* Staph 24 agar were at least 1 mm in diameter and easy to pick off, giving enough material for further confirmatory testing. It was also noted that *Brilliance* Staph 24 agar seemed more efficient at recovering small numbers of *S. aureus* than SASelect Agar.

Conclusion

- *Brilliance* Staph 24 Agar detected more coagulase positive staphylococci than SASelect Agar.
- Sensitivity of *Brilliance* Staph 24 Agar was statistically significantly higher than SASelect Agar.
- NPV of *Brilliance* Staph 24 Agar and CBA was considerably higher than SASelect Agar.
- Results were available within 24 hr. when using *Brilliance* Staph 24 Agar; routine laboratory methods using SASelect and CBA took up to 48 hr. to give a result.
- Specificity of *Brilliance* Staph 24 Agar was comparable to SASelect Agar and CBA.
- *Brilliance* Staph 24 Agar has proven to be a highly sensitive and reliable medium for detection of coagulase positive staphylococci from wound swabs in a clinical setting.

References

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