Rapid phenotypic MRSA detection by a real-time laser-scattering method

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Introduction

Rapid differentiation between methicillin-susceptible (MSSA) and methicillin-resistant (MRSA) *Staphylococcus aureus* isolates is crucial for the initiation of an appropriate and targeted antimicrobial therapy. However, recent approaches are time-consuming necessitating eight to twenty four hours. BacterioScan™216R (BacterioScan Inc., St Louis, US) is an instrument which uses laser-scattering technology to rapidly quantify bacteria in fluid samples.

Objectives

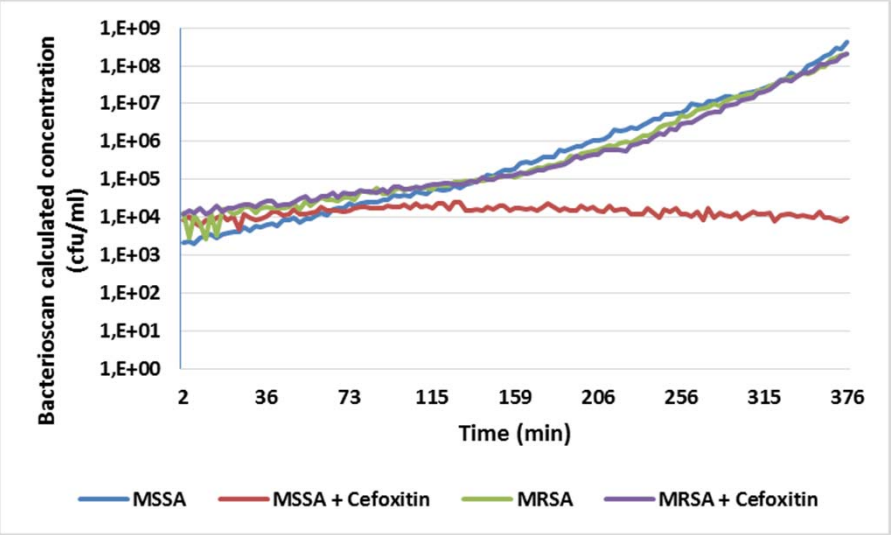
This study aimed (i) to determine the potential of this method to differentiate between methicillin-resistant and methicillin-susceptible *S. aureus* strains and (ii) to determine the incubation time required for reliable result.

Results

Differentiation between MSSA and MRSA was possible in less than 2.5 hours.

Detection of **MSSA** was based on a difference of at least 1 $\log_{10}$ cfu/ml between the growth control curve and the growth curve of the same strain with addition of cefoxitin.

In **MRSA**, growth curves under addition of cefoxitin are comparable with the growth control without antibiotic and the above-mentioned criterion is not achieved. The results were reproducible among the experiments. Sterility control curve remained under the device's detection level.



Methods

Suspensions of 5x10^5 cfu/ml of *S. aureus* ATCC 29213 (MSSA) and *S. aureus* ATCC BAA-44 (MRSA) reference strains were prepared in Brain-Heart-Infusion (BHI) broth and incubated in BacterioScan™216R instrument with and without addition of cefoxitin in breakpoint concentration 4 µg/ml. Incubation was accomplished at 36°C for up to 24 hours, measurements were taken approx. every 3 min for each sample. The tests were performed in triplicate, sterile BHI control was included.

Conclusion

Real-time laser-scattering method using BacterioScan™216R allows for rapid phenotypic MRSA detection. Optimization of inoculum size, broth, cut-off criteria and other conditions may allow even shorter time to result. Future investigations are warranted to compare this approach with standard AST procedures applying large collection of clinical MRSA and MSSA strains.

Acknowledgements:

We are grateful to Barbara Grünastel und Damayanti Kaiser for expert technical assistance, and to Rajesh Anbazhagan (BacterioScan Inc., St. Louis, MO, USA) for helpful technical advices. BacterioScan instrument and consumables have been provided by BacterioScan Inc.

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