

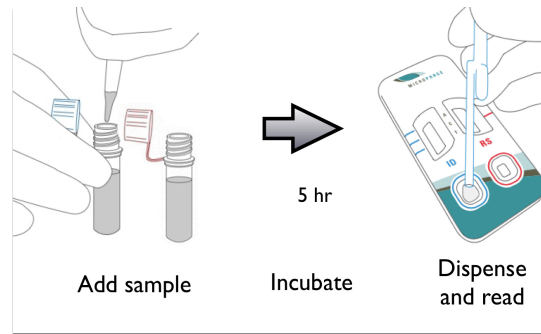
Sensitivity and Specificity of the MicroPhage MRSA/MSSA Blood Culture Test for Bactec

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Background: *S. aureus* bacteremia is a significant cause of morbidity and mortality. The rate of appropriate antibiotic therapy for bacteremia is surprisingly low¹, due in part to the lack of rapid test methods that can accurately determine antibiotic susceptibility. The MicroPhage test, which is based on bacteriophage amplification, can return identification and susceptibility results from positive blood culture in 5 hours in a single-use kit. We report the sensitivity and specificity of this product against a panel of *S. aureus* and coagulase-negative *Staphylococci* using a spike model of blood culture in the Bactec system.

Methods: A panel of 64 *S. aureus* and 16 CoNS clinical isolates was spiked into Bactec blood culture bottles charged with fresh blood drawn from volunteers at 1-10 cfu/ml. Bottles were incubated in a Bactec 9050 until detection of positivity. Bottle types tested were SA, SN, Plus A and Plus N. Samples were drawn from positive cultures at 0-4 and 22-26 hours after detection, and run in duplicate in the MicroPhage MRSA/MSSA Blood Culture Test for Bactec. Lateral Flow Immunoassay devices were scored as MRSA, MSSA or NSA (not- *S. aureus*) by a panel of three blinded readers. Samples returning false positive results were plated for single colonies on selective media and excluded if they proved to be contaminated.



The MicroPhage test: 10 μ l of a positive blood culture is collected and placed in a test bottle containing bacteriophage and culture broth. The mixture is incubated, allowing the bacteriophage to amplify if the target species is present. Amplification is detected by anti-phage antibodies on a lateral-flow immunoassay device

Results: The MicroPhage MRSA/MSSA Blood Culture Test for Bactec shows high sensitivity and specificity in detecting *S. aureus*. Positive predictive values for MRSA and MSSA determination are high with 3% major discrepancies and 0% very major discrepancies, thus the Test is able to accurately classify MRSA and MSSA strains. There is no detected difference in performance amongst all Bactec bottles types and sampling times up to 24 hours.

Performance of the MicroPhage MRSA/ MSSA Blood Culture Test

Parameter	Value	95% CI
<i>S. aureus</i> ID Sensitivity	99%	98 - 100%
<i>S. aureus</i> ID Specificity	100%	94 - 100%
AST MD	3.1%	1.0 - 5.2%
AST VMD	0%	0 - 2.1%
MRSA PPV	94%	89 - 97%
MSSA PPV	100%	97 - 100%

AST = Antibiotic Susceptibility Test, MD = Major Discrepancy (false resistant), VMD = Very Major Discrepancy (false sensitive)

Conclusions: The MicroPhage MRSA/MSSA Blood Culture Test for Bactec shows good sensitivity and specificity in all four Bactec bottle types tested at early and late times after detection of positivity. The Test is rapid (5 hour), has minimal hands on time, is inexpensive and requires little training to perform.

The MicroPhage Test differs from molecular tests by detecting phenotypic antibiotic susceptibility, rather than by detecting a resistance gene. Rapid, accurate susceptibility determination should enable clinicians to implement appropriate antibiotic therapy sooner, and lead to better patient outcomes.

¹ Kaye et al. The deadly toll of invasive methicillin-resistant *Staphylococcus aureus* infection in community hospitals. Clin Infect Dis (2008) vol. 46 (10) pp. 1568-77
Herzke et al. Empirical antimicrobial therapy for bloodstream infection due to methicillin-resistant *Staphylococcus aureus*: no better than a coin toss. Infect Control Hosp Epidemiol (2009) vol. 30 (11) pp. 1057-61