

Overview

Useful For

Detection of *mecA* in staphylococcal bacterial isolates

Evaluation of treatment options when oxacillin or ceftazidime breakpoints are unavailable (eg, some *Staphylococcus* species, not *S aureus*)

Prediction of antimicrobial resistance when bacterial growth is inadequate for phenotypic antimicrobial susceptibility testing (eg, staphylococcal small colony variants; SCVs)

Assessment of discrepancies between ceftazidime and oxacillin phenotypic testing results

Highlights

Rapid molecular test that detects *mecA* DNA associated with prediction of antimicrobial resistance to methicillin and other applicable beta-lactam antibiotics in isolates of *Staphylococcus* species.

Special Instructions

- [Infectious Specimen Shipping Guidelines](#)

Method Name

Real-Time Polymerase Chain Reaction (PCR) Using LightCycler with Amplified Product Detection Using Fluorescent Resonance Energy Transfer (FRET) Hybridization Probes

NY State Available

Yes

Specimen

Specimen Type

Varies

Shipping Instructions

1. See [Infectious Specimen Shipping Guidelines](#) in Special Instructions for shipping information.
2. Place specimen in a large infectious container (T146) and label as an etiologic agent/infectious substance.

Necessary Information

Organism identification and specimen source are required.

Specimen Required

Supplies: Infectious Container, Large (T146)

Collection Container/Tube: Agar slant or other appropriate media

Specimen Volume: Organism in pure culture

Collection Instructions:

1. Perform isolation of bacteria.
2. Organism must be in pure culture, actively growing. **Do not submit mixed cultures.**

Reject Due To

Other	Â Agar plate, mixed culture
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Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Ambient (preferred)		
	Frozen		
	Refrigerated		

Clinical and Interpretive
Clinical Information

Bacteria can acquire resistance to certain beta-lactam antibiotics through a variety of mechanisms. One such mechanism is the *mecA* gene. The *mecA* gene encodes penicillin-binding protein 2a (PBP2a), which is a PBP that has a low affinity for beta-lactam antibiotics. Bacteria expressing this gene are able to maintain cell wall synthesis even in the presence of beta-lactam antibiotics. Clinically significant *mecA*-mediated resistance is restricted to staphylococci.

Testing of bacterial isolates by molecular methods may be needed when oxacillin or cefoxitin breakpoints are unavailable (eg, *Staphylococcus* species, not *S aureus*) or when discrepancies between cefoxitin and oxacillin phenotypic antimicrobial susceptibility testing results exist. Use of this assay may also be helpful when isolates do not grow adequately for phenotypic antimicrobial susceptibility testing (eg, staphylococcal small colony variants; SCVs).

Reference Values

Not applicable

Interpretation

This PCR detects the *mecA* gene. A positive result for this *mecA* PCR test strongly suggests resistance to beta-lactam antibiotics other than ceftaroline in a staphylococcal isolate. If the *mecA* PCR test is positive, and the patient is on a beta-lactam antimicrobial that would be predicted to be resistant, the clinician should consider escalating the antimicrobial treatment to an appropriate therapy.

A negative result indicates the absence of detectable DNA.

Cautions

Only pure isolates of staphylococcal species should be tested.

This test should be used in conjunction with phenotypic antimicrobial susceptibility tests, when available, and interpreted in light of the patient's clinical condition.

False-negative results may occur due to inhibition of PCR, sequence variability underlying primers and probes, or the

presence of the *mecA* genes in quantities lower than the limit of detection of the assay.

Supportive Data

This test demonstrated 100% concordance for testing performed on 72 methicillin-resistant *Staphylococcus aureus* (MRSA) isolates and 42 methicillin-susceptible *S aureus* (MSSA) isolates.

In addition, this test demonstrated 100% concordance for 43 methicillin-resistant *Staphylococcus* isolates, not *S aureus*, and 96.5% concordance for 57 methicillin-susceptible *Staphylococcus* isolates, not *S aureus*.

Clinical Reference

Miragaia M. Factors Contributing to the Evolution of *mecA*-Mediated Beta-lactam Resistance in Staphylococci: Update and New Insights From Whole Genome Sequencing (WGS). *Front Microbiol.* 2018 Nov 13;9:2723. doi: 10.3389/fmicb.2018.02723

Performance

Method Description

Nucleic acids are released from bacterial isolates followed by PCR which employs a target-specific detection system including primers, as well as fluorescent resonance energy transfer (FRET) hybridization probes which target the *mecA* gene. The LightCycler instrument amplifies and monitors target nucleic acid sequences by fluorescence during PCR cycling. This is an automated PCR system that rapidly detects amplified product development through stringent air-controlled temperature cycling and capillary cuvettes. Detection of amplified products is based on the FRET principle. For FRET product detection, a hybridization probe with a donor fluorophore, fluorescein, on the 3' end is excited by an external light source, which emits light that is absorbed by a second hybridization probe with an acceptor fluorophore. The acceptor fluorophore then emits light of a different wavelength that is measured with a signal proportional to the amount of specific PCR product. The detection process is completed in a closed system. (Cockerill FR, Uhl JR: Applications and challenges of real-time PCR for the clinical microbiology laboratory. In *Rapid Cycle Real-Time PCR Methods and Applications*. Edited by U Reischl, C Wittwer, F Cockerill. Springer-Verlag, 2002, pp 3-27; Simner PJ, Humphries R: Chapter 75: Special Phenotypic Methods for Detecting Antibacterial Resistance: In *Manual of Clinical Microbiology*. 12th edition. Edited by KC Carroll, MA Pfaller. American Society for Microbiology; 2019. pp. 1316-1347)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

2 to 5 days

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to [Test Prices](#) for detailed fee information.
- Clients without access to Test Prices can contact [Customer Service](#) 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact [Customer Service](#).

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information

87150

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
MARP	mecA PCR	48813-0

Result ID	Test Result Name	Result LOINC Value
MASRC	Specimen Source	39111-0
MAORG	Organism Identified by Client	43409-2
607725	mecA PCR	48813-0