MAYO CLINIC LABORATORIES

Test Definition: CARNP

Carbapenemase Detection-Carba NP Test, Varies

Overview

Useful For

Confirming carbapenemase production from pure isolates of Enterobacterales or *Pseudomonas aeruginosa*

Additional Tests

Test Id	Reporting Name	Available Separately	Always Performed
CARNB	Carbapenemase-Carba NP Test	No	Yes

Special Instructions

- Infectious Specimen Shipping Guidelines

Method Name

Colorimetric Detection of Carbapenem Hydrolysis

NY State Available

Yes

Specimen

Specimen Type

Varies

Shipping Instructions

1. For shipping information see Infectious Specimen Shipping Guidelines.
2. Place specimen in a large infectious container (T146) and label as an etiologic agent/infectious substance.

Necessary Information

Specimen source and organism identification are required.

Specimen Required

Specimen Type: Organism

Supplies: Infectious Container, Large (T146)

Container/Tube: Slant

Specimen Volume: Isolate

Collection Instructions: Submit Enterobacterales or *Pseudomonas aeruginosa* isolate in pure culture (ie, not mixed with other organisms), actively growing.

Forms

If not ordering electronically, complete, print, and send a Microbiology Test Request (T244) with the specimen.

Specimen Minimum Volume

See Specimen Required

Reject Due To

Agar plate	Reject

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Gram-negative bacilli (GNB) with acquired carbapenemases have disseminated worldwide, rendering them a global threat. The therapeutic armamentarium for infections caused by carbapenem-resistant Enterobacterales (CRE) is limited, and CRE infections have been associated with significant mortality. Enterobacterales harboring *Klebsiella pneumoniae* carbapenemase are endemic in some regions of the United States, and although still sporadic, GNB harboring New Delhi metallo-beta-lactamase have been reported from several states. Timely detection of these carbapenemases (along with emerging carbapenemases such as OXA-48 and VIM) is important. Detection is challenging since isolates may have only borderline reductions in susceptibility to carbapenems, and carbapenem resistance may be mediated by mechanisms other than carbapenemases (eg, *AmpC* or extended-spectrum beta-lactamase with decreased membrane permeability). While molecular methods are confirmatory, testing may not be immediately available and may be limited by the number of targets assayed. The Carba NP test is preferred over the *mCIM* (modified carbapenem inactivation method) test due to faster turnaround time.

If an isolate is suspected to possess KPC or NDM carbapenemase (eg, due to local epidemiology), Carbapenem Resistance Genes, Molecular Detection, PCR, Varies (CARBI) may be preferred over the Carba NP test.

Reference Values

Negative

Interpretation

A positive result indicates production of a carbapenemase by the isolate submitted for testing. A negative result indicates lack of production of a carbapenemase by the isolate submitted for testing.

Cautions

Results of the Carba NP test should be interpreted along with antimicrobial susceptibility testing results. Phenotypic

resistance to carbapenems may be due to traits other than carbapenemase production (eg, *AmpC* or extended-spectrum beta-lactamase production with decreased membrane permeability). Additionally, a positive test is only indicative of carbapenemase production in general; the assay does not determine the type of carbapenemase present (e.g., NDM-1, KPC, OXA-48-like). If an isolate is suspected to possess KPC or NDM carbapenemase (eg, due to local epidemiology), CARBI / Carbapenem Resistance Genes, Molecular Detection, PCR, Varies may be preferred.

False-negative results may occur due to plasmid loss in isolates submitted for testing, the presence of a nonexpressed carbapenemase gene, or low-level carbapenemase expression.

Supportive Data

We evaluated 271 gram -negative bacilli (of which 131 were carbapenemase producers and of which 201 were Enterobacterales) using the Carba NP test and the modified Hodge test. Sensitivity for detection of carbapenemase production was comparable (Carba NP, 100 versus modified Hodge test, 98%, p=0.08), but the Carba NP test was more specific (100 versus 80%, p<0.0001) and faster.(1)

Clinical Reference

1. Vasoo S, Cunningham SA, Kohner PC, et al. Comparison of a novel, rapid chromogenic biochemical assay, the Carba NP test, with the modified Hodge test for detection of carbapenemase-producing Gram-negative bacilli. J Clin Microbiol. 2013;51(9):3097-3101

2. Nordmann P, Poirel L, Dortet L. Rapid detection of carbapenemase-producing *Enterobacteriaceae*. Emerg Infect Dis. 2012;18(9):1503-1507

3. Clinical and Laboratory Standards Institute (CLSI): Performance Standards for Antimicrobial Susceptibility Testing. 33rd ed. CLSI Supplement M100, CLSI; 2023

Performance

Method Description

A pure bacterial isolate is emulsified into cell lysis buffer in 2 tubes: one contains the base indicator solution (phenol red with zinc salts) alone and the other contains the base indicator solution plus imipenem (6 mg/mL). The tubes are incubated at 37 degrees C for 2 hours. A positive reaction is indicated by a color change from red to yellow as a result of hydrolysis of the beta-lactam ring of imipenem.(Vasoo S, Cunningham SA, Kohner PC, et al: Comparison of a novel, rapid chromogenic biochemical assay, the Carba NP test, with the modified Hodge test for detection of carbapenemase-producing Gram-negative bacilli. J Clin Microbiol. 2013;51[9]:3097-3101)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

2 to 4 days

Performing Laboratory Location
Rochester

Fees & 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 account representative. 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. It has not been cleared or approved by the US Food and Drug Administration.

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CARNP	Carbapenemase-Carba NP Test	74676-8

Result ID	Test Result Name	Result LOINC® Value
CARNP	Carbapenemase-Carba NP Test	74676-8