Test Definition: CARNP
Carbapenemase-Carba NP Test

Overview

Useful For
 Confirmation of carbapenemase production from pure isolates of Enterobacteriaceae or Pseudomonas aeruginosa

Additional Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARNB</td>
<td>Carbapenemase-Carba NP Test</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Special Instructions

- [Infectious Specimen Shipping Guidelines]

Method Name
Colorimetric Detection of Carbapenem Hydrolysis

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
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 Enterobacteriaceae 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.
Test Definition: CARNP
Carbapenemase-Carba NP Test

Reject Due To

| Other     | Agar plate |

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Ambient (preferred)</td>
<td></td>
<td>Refrigerated</td>
</tr>
</tbody>
</table>

Clinical and 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 Enterobacteriaceae (CRE) is limited, and CRE infections have been associated with significant mortality. Enterobacteriaceae 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 modified Hodge test suffers from lack of specificity, a long turnaround time, and poor sensitivity for metallo-beta-lactamase detection. The Carba NP test is preferred over the modified Hodge test due to improved specificity and faster turnaround time.

The Carba NP test is more specific than and as sensitive as the carbapenemase-modified Hodge test. If an isolate is suspected to possess KPC or NDM carbapenemase (eg, due to local epidemiology), KPC and NDM PCR (KPNRP / KPC (blaKPC) and NDM (blaNDM) in Gram-Negative Bacilli, Molecular Detection, PCR) 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 (eg, NDM-1, KPC, OXA-48-like). If an isolate is suspected to possess KPC or NDM carbapenemase (eg, due to local epidemiology), KPC and NDM PCR (KPNRP / KPC (blaKPC) and NDM (blaNDM) in Gram-Negative Bacilli, Molecular Detection, PCR) 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 stain-negative bacilli (of which 131 were carbapenemase producers and of which 201 were Enterobacteriaceae) 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


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 P, 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) and Time(s) Test Performed
Monday through Friday

Analytic Time
2 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.
## LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARNP</td>
<td>Carbapenemase-Carba NP Test</td>
<td>74676-8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARNP</td>
<td>Carbapenemase-Carba NP Test</td>
<td>74676-8</td>
</tr>
</tbody>
</table>