Overview

Useful For
Screening children for catecholamine-secreting tumors with a 24-hour urine collection when requesting testing for only vanillylmandelic acid

Supporting a diagnosis of neuroblastoma

Monitoring patients with a treated neuroblastoma

Special Instructions
• Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens

Highlights
Vanillylmandelic acid (VMA) and other catecholamine metabolites such as homovanillic acid (HVA) measurement in urine are used for screening children for catecholamine-secreting tumors such as neuroblastoma and other neural crest tumors and monitoring those who have had treatment for these tumors.

More than 90% of individuals with neuroblastoma have elevated VMA and/or HVA.

VMA is not the analyte of choice for diagnosis of pheochromocytoma, which is better detected by testing for metanephrines.

Treatment with L-dopa can impact test results and should be discontinued 24 hours prior to collection. Bactrim can impact test results and should be noted at time of collection.

Method Name
Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

NY State Available
Yes
Specimen

Specimen Type
Urine

Ordering Guidance
In the past, this test has been used to screen for pheochromocytoma. However, vanillylmandelic acid (VMA) is not the analyte of choice to rule out a diagnosis of pheochromocytoma. Recommended tests for that purpose include:

- PMET / Metanephrines, Fractionated, Free, Plasma
- META / Metanephrines, Fractionated, 24 Hour, Urine
- CATU / Catecholamine Fractionation, Free, 24 Hour, Urine

Necessary Information
1. Patients age is required.
2. Collection duration and urine volume are required.
3. All patients receiving L-dopa should be identified to the laboratory when this test is ordered.
4. Bactrim may interfere with detection of the analyte. All patients taking Bactrim should be identified to the laboratory when this test is ordered.

Specimen Required
Patient Preparation: Administration of L-dopa may falsely-increase vanillylmandelic acid results; it should be discontinued 24 hours prior to and during collection of specimen.

Supplies: Urine Tubes, 10 mL (T068)

Specimen Volume: 5 mL

Collection Instructions:
1. Collect a 24-hour urine specimen.
2. Add 25 mL of 50% acetic acid as preservative at the start of collection. If specimen is refrigerated during collection, preservative may be added up to 12 hours after collection. Use 15 mL of 50% acetic acid for children <5 years old. This preservative is intended to achieve a pH of between approximately 1 and 5. If necessary, adjust urine pH to 1 to 5 with 50% acetic or hydrochloric acid.

Additional Information: See Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens in Special Instructions for multiple collections.
Test Definition: VMA
Vanillylmandelic Acid, 24 Hr, U

Forms
If not ordering electronically, complete, print, and send an Oncology Test Request (T729) with the specimen.

Urine Preservative Collection Options
Note: The addition of preservative or application of temperature controls must occur within 4 hours of completion of the collection.

<table>
<thead>
<tr>
<th>Preservative</th>
<th>Acceptable Status</th>
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<tbody>
<tr>
<td>Ambient</td>
<td>No</td>
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<tr>
<td>Refrigerate</td>
<td>No</td>
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<tr>
<td>Frozen</td>
<td>No</td>
</tr>
<tr>
<td>50% Acetic Acid</td>
<td>Preferred</td>
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<tr>
<td>Boric Acid</td>
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<tr>
<td>Diazolidinyl Urea</td>
<td>No</td>
</tr>
<tr>
<td>6M Hydrochloric Ac</td>
<td>OK</td>
</tr>
<tr>
<td>6M Nitric Acid</td>
<td>OK</td>
</tr>
<tr>
<td>Sodium Carbonate</td>
<td>No</td>
</tr>
<tr>
<td>Thymol</td>
<td>No</td>
</tr>
<tr>
<td>Toluene</td>
<td>No</td>
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*If boric acid is used, note on specimen container. Also, verify that pH is in desired range (pH=1-5). If pH is outside of desired range, adjust pH with a stronger acid (acetic acid is preferred but other acids listed above could be used if available) in a dropwise fashion to bring pH into desired range.

Reject Due To
All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Minimum Volume
2 mL

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<tbody>
<tr>
<td>Urine</td>
<td>Refrigerated (preferred)</td>
<td>28 days</td>
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<tr>
<td></td>
<td>Frozen</td>
<td>180 days</td>
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Clinical & Interpretive
Clinical Information
Vanillylmandelic acid (VMA) and other catecholamine metabolites (homovanillic acid: HVA and dopamine) are typically elevated in patients with catecholamine-secreting tumors (eg, neuroblastoma, pheochromocytoma, and other neural crest tumors). VMA and HVA levels may also be useful in monitoring patients who have been treated as a result of 1 of the above-mentioned tumors.

Reference Values
<1 year: <25.0 mg/g creatinine
1 year: <22.5 mg/g creatinine
2-4 years: <16.0 mg/g creatinine
5-9 years: <12.0 mg/g creatinine
10-14 years: <8.0 mg/g creatinine
> or =15 years (adults): <8.0 mg/24 hours

Interpretation
Vanillylmandelic acid and/or homovanillic acid concentrations are elevated in most patients (more than 90%) with neuroblastoma; both tests should be performed. A positive test could be due to a genetic or nongenetic condition. Additional confirmatory testing is required.

A normal result does not exclude the presence of a catecholamine-secreting tumor.

Elevated values are suggestive of a pheochromocytoma, but they are not diagnostic.

Cautions
Values are more commonly elevated during a hypertensive episode.

Values may be normal in some individuals with pheochromocytoma.

All patients taking Bactrim should be identified to the laboratory when VMA and HVA tests are ordered due to potential interference.
Test Definition: VMA
Vanillylmandelic Acid, 24 Hr, U

Clinical Reference


Performance

Method Description
Vanillylmandelic acid (VMA) is measured by solid-phase extraction (SPE) of a 1-mL aliquot of urine. A known amount of stable-isotope labeled VMA internal standard (IS) is added to each urine specimen prior to SPE. VMA and IS are eluted from the SPE column with methanol. The methanol is evaporated and the VMA and IS are redissolved in liquid chromatography tandem-mass spectrometry (LC-MS/MS) mobile phase. A portion of this prepared extract is injected onto a LC column that separates VMA and IS from the bulk of any remaining specimen matrix. The VMA and IS are measured by tandem-mass spectrometry using the selected reaction monitoring mode. VMA is quantified using the ratio to IS versus urine calibrators. (Magera MJ, Thompson AL, Stoor AL, et al: Determination of vanillylmandelic acid in urine by stable isotope dilution and electrospray tandem mass spectrometry. Clin Chem. 2003;49:825-826; Eisenhofer G, Grebe S, Cheung NV: Monoamine-producing tumors. In Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:chap 63)

PDF Report
No

Specimen Retention Time
1 week

Performing Laboratory Location
Rochester
Fees & Codes

Test Definition: VMA
Vanillylmandelic Acid, 24 Hr, U

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 US Food and Drug Administration.

CPT Code Information
84585

LOINC® Information

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<th>Test Order Name</th>
<th>Order LOINC Value</th>
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<tr>
<td>VMA</td>
<td>Vanillylmandelic Acid, 24 Hr, U</td>
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<table>
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