Test Definition: VMA

Vanillylmandelic Acid, 24 Hr, U

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

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.

Special Instructions

- Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Urine

Advisory Information

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

-METAF / 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: SeeUrine Preservatives-Collection and Transportation for 24-Hour Urine Specimens inSpecial Instructions for multiple collections.

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.

Ambient	No
Refrigerate	No
Frozen	No
50% Acetic Acid	Preferred
Boric Acid	OK
Diazolidinyl Urea	No
6M Hydrochloric Acid	OK
6M Nitric Acid	OK
Sodium Carbonate	No
Thymol	No
Toluene	No

*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.

Specimen Minimum Volume

2 mL

Reject Due To

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

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	28 days	
	Frozen	180 days	

Clinical and 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.

Clinical Reference

1. Hyland K: Disorders of neurotransmitter metabolism. In: Blau N, Duran M, Blaskovics ME, Gibson KM, eds. Physicianâ€™s Guide to the Laboratory Diagnosis of Metabolic Diseases. Springer; 2003:107-122. doi: 10.1007/978-3-642-55878-8_8

2. Gitlow SE, Bertrani LM, Rausen A, Gribetz D, Dziedzic SW: Diagnosis of neuroblastoma by qualitative and quantitative determination of catecholamine metabolites in urine. Cancer. 1970 Jun;25(6):1377-1383

3. Strenger V, Kerbl R, Dornbusch HJ, et al: Diagnostic and prognostic impact of urinary catecholamines in neuroblastoma patients. Pediatr Blood Cancer. 2007 May;48(5):504-509

4. Barco S, Gennai I, Reggiardo G, et al: Urinary homovanillic and vanillylmandelic acid in the diagnosis of neuroblastoma: report from the Italian Cooperative Group for Neuroblastoma. Clin Biochem. 2014 Jun;47(9):848-852

5. Matthay KK, Maris JM, Schleiermacher G, et al: Neuroblastoma. Nat Rev Dis Primers. 2016 Nov 10;2:16078. doi: 10.1038/nrdp.2016.78

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 mass spectrometry/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

Day(s) and Time(s) Test Performed

Monday, Thursday; 8 a.m.

Analytic Time

2 days (not reported on Sunday)

Maximum Laboratory Time

4 days

Specimen Retention Time

1 week

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

84585

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
VMA	Vanillylmandelic Acid, 24 Hr, U	43099-1

Result ID	Test Result Name	Result LOINC Value
3580	Vanillylmandelic Acid, Adult (>14y)	3122-9
3581	Vanillylmandelic Acid, Child (	30571-4
TM41	Collection Duration	13362-9
VL39	Urine Volume	3167-4