MAYO CLINIC LABORATORIES

Test Definition: HVA

Homovanillic Acid, 24 Hour, Urine

Overview

Useful For

Screening children for catecholamine-secreting tumors using a 24-hour urine collection when requesting homovanillic acid only

Monitoring neuroblastoma treatment

Screening patients with possible inborn errors of catecholamine metabolism

Special Instructions

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

Highlights

Homovanillic acid (HVA) measurement in urine is used for screening children for catecholamine-secreting tumors, such as neuroblastoma, pheochromocytoma, and other neural crest tumors, and monitoring those who have had treatment for these tumors.

Measurement of HVA is also useful for diagnosing children with disorders of catecholamine metabolism, such as monoamine oxidase-A deficiency and dopamine beta-hydroxylase deficiency, which result in either decreased or elevated urinary HVA values, respectively.

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

Necessary Information

1. Patient's age is required.

2. Collection duration (in hours) and urine volume (in milliliters) 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 homovanillic acid results. For 24 hours prior to and during specimen collection, the patient should **not** take L-dopa.
Supplies: Urine Tubes, 10 mL (T068)
Container/Tube: Plastic, 10-mL urine tube
Specimen Volume: 5 mL
Collection Instructions:
1. Add 25 mL of 50% acetic acid as preservative at start of collection. Use 15 mL of 50% acetic acid for children younger than 5 years. If specimen is refrigerated during collection, preservative may be added up to 12 hours after collection. This preservative is intended to achieve a pH of between approximately 1 and 5.
2. Collect a 24-hour urine specimen.
3. If necessary, adjust urine pH to a level between 1 and 5 by adding 50% acetic acid or hydrochloric acid dropwise and checking the pH.
Additional Information:
1. The sensitivity of this test is greater on a 24-hour specimen than on a random specimen.
2. See Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens 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: For preservative or application of temperature controls timing, see Specimen Required.

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

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 & Interpretive

Clinical Information

Homovanillic acid (HVA) and other catecholamine metabolites (vanillylmandelic acid [VMA] and dopamine) are typically elevated in patients with catecholamine-secreting tumors (eg, neuroblastoma, pheochromocytoma, and other neural crest tumors). HVA and VMA levels may also be useful in monitoring patients who have been treated as a result of the above-mentioned tumors. HVA levels may also be altered in disorders of catecholamine metabolism; monoamine oxidase-A deficiency can cause decreased urinary HVA values, while a deficiency of dopamine beta-hydrolase (the enzyme that converts dopamine to norepinephrine) can cause elevated urinary HVA values.

Reference Values

<1 year: <35.0 mg/g creatinine
1 year: <30.0 mg/g creatinine
2-4 years: <25.0 mg/g creatinine
5-9 years: <15.0 mg/g creatinine
10-14 years: <9.0 mg/g creatinine
> or =15 years (adults): <8.0 mg/24 hours

Interpretation

Vanillylmandelic acid or homovanillic acid (HVA) concentrations are elevated in over 90% of patients 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 HVA values are suggestive of a deficiency of dopamine beta-hydrolase, a neuroblastoma, a pheochromocytoma, or may reflect administration of L-dopa.

Decreased urinary HVA values may suggest monoamine oxidase-A deficiency.

Cautions

Administration of L-dopa may falsely increase homovanillic acid (HVA) results. Patients receiving L-dopa should stop taking it for 24 hours before and during the collection.

All patients receiving L-dopa should be identified to the laboratory when vanillylmandelic acid (VMA) and HVA tests are ordered.

All patients taking Bactrim should be identified to the laboratory when VMA and HVA tests are ordered due to potential interference.

Clinical Reference

1. Eisenhofer G. Monoamine-producing tumors. In: Rifai N, Chiu RWK, Young I, Burnham CD, Wittwer CT, eds. Tietz

Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:765
2. Ormazabal A, Molero-Luis M, Garcia-Cazorla A, Artuch R. Biomarkers for the study of catecholamine and serotonin genetic diseases. In: Garg U, Smith LD, eds. Biomarkers in Inborn Errors of Metabolism: Clinical Aspects and Laboratory Determination. Elsevier; 2017:301-329
3. Strenger V, Kerbl R, Dornbusch HJ, et al. Diagnostic and prognostic impact of urinary catecholamines in neuroblastoma patients. Pediatr Blood Cancer. 2007;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;47(9):848-852
5. Matthay KK, Maris JM, Schleiermacher G, et al. Neuroblastoma. Nat Rev Dis Primers. 2016;2:16078. doi: 10.1038/nrdp.2016.78

Performance

Method Description

Homovanillic acid (HVA) is measured by solid-phase extraction (SPE) of a 1-mL aliquot of urine. A known amount of stable-isotope labeled HVA internal standard (IS) is added to each urine specimen prior to SPE. HVA and IS are eluted from the SPE column with methanol. The methanol is evaporated, and the HVA 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 HVA and IS from the bulk of any remaining specimen matrix. The HVA and IS are measured by mass spectrometry/tandem-mass spectrometry using the selected reaction monitoring mode. HVA is quantified using the ratio to IS versus urine calibrators.(Magera MJ, Stoor A, Helgeson JK, Matern D, Rinaldo P. Determination of homovanillic acid in urine by stable isotope dilution and electrospray tandem mass spectrometry. Clin Chim Acta. 2001;306[1-2]:35-41; 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) Performed

Monday through Friday

Report Available

2 to 4 days

Specimen Retention Time

7 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

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.

CPT Code Information

83150

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
HVA	Homovanillic Acid (HVA), 24 Hr, U	13760-4

Result ID	Test Result Name	Result LOINC® Value
3572	Homovanillic Acid, Adult (>14 yr)	2436-4
3573	Homovanillic Acid, Child (<15 yr)	13760-4
TM39	Collection Duration	13362-9
VL37	Urine Volume	3167-4