Test Definition: HVAR

Homovanillic Acid, Random, Urine

Overview

Useful For

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

Monitoring neuroblastoma treatment

Screening patients with possible inborn errors of catecholamine metabolism

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.

HVA measurement is also useful to diagnose 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. All patients receiving L-dopa should be identified to the laboratory when this test is ordered.

3. 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

specimen collection, the patient should **not** take L-dopa.
Supplies: Urine Tubes, 10 mL (T068)
Collection Container/Tube: Clean, plastic urine collection container
Submission Container/Tube: Plastic, 10-mL urine tube
Specimen Volume: 5 mL
Collection Instructions:
1. Collect a random urine specimen.
2. Adjust the urine pH to a level between 1 and 5 by adding 50% acetic acid or hydrochloric acid dropwise and checking the pH.

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

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/g creatinine

Interpretation

Vanillylmandelic acid and/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 the collection.

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

Bactrim may interfere with detection of the analyte. All patients taking Bactrim should be identified to the laboratory when VMA and HVA tests are ordered.

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
HVAR	Homovanillic Acid (HVA), Random, U	11146-8

Result ID	Test Result Name	Result LOINC® Value
60275	Homovanillic Acid (HVA), Random, U	11146-8