

## Overview

### Useful For

Screening children for catecholamine-secreting tumors with a 24-hour 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 results 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.

### 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

### Necessary Information

1. Collection duration and urine volume are required.
2. Patient's age is 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; it should be discontinued 24 hours prior to and during collection of specimen.

**Supplies:** Urine Tubes, 10 mL (T068)

**Container/Tube:** Plastic, 10-mL urine tube

**Specimen Volume:** 5 mL

**Collection Instructions:**

1. Collect a 24-hour urine specimen.
2. Add 25 mL of 50% acetic acid as preservative at 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 less than 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:**

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](#) in Special 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	No
Diazolidinyl Urea	No
6M Hydrochloric Acid	OK
6M Nitric Acid	OK
Sodium Carbonate	No
Thymol	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 and Interpretive

#### Clinical Information

Homovanillic acid (HVA) and other catecholamine metabolites (vanillylmandelic acid: [MA 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-hydroxylase (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 (VMA) 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-hydroxylase, 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. Hyland K: Disorders of neurotransmitter metabolism. In: Blau N, Duran M, Blaskovics ME, Gibson KM, eds. *Physician's Guide to the Laboratory Diagnosis of Metabolic Diseases*. Springer;. 2003: 107-122. doi: 10.1007/978-3-642-55878-8\_8
2. Hyland K: Presentation, diagnosis, and treatment of the disorders of monoamine neurotransmitter metabolism. *Sem Perinatol*. 1999 Apr;23(2):194-203
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

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 Apr;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

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 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 (	13760-4
TM39	Collection Duration	13362-9
VL37	Urine Volume	3167-4