

Overview

Useful For

A first- and second-order screening test for the presumptive diagnosis of catecholamine-secreting pheochromocytomas and paragangliomas

Testing in conjunction or as an alternative to plasma metanephrines (PMET / Metanephrines, Fractionated, Free, Plasma) or plasma catecholamine (CATP / Catecholamine Fractionation, Free, Plasma) testing

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

24-Hour volume (in milliliters) is required.

Specimen Required

Patient Preparation: Tricyclic antidepressants, labetalol, and sotalol medications may elevate levels of catecholamines producing results that cannot be interpreted. If clinically feasible, it is optimal to discontinue these medications at least 1 week before collection. Levodopa (Sinemet) medication will cause false-positive results. For advice on assessing the risk of removing patients from these medications and alternatives, consider consultation with a specialist in endocrinology or hypertension.

Supplies: Urine Tubes, 10 mL (T068)

Submission Container/Tube: Plastic urine tube

Specimen Volume: 10 mL

Collection Instructions:

- Complete 24-hour urine collections are preferred, especially for patients with episodic hypertension; ideally the collection should begin at the onset of a "spell."
- Add 10 g (pediatric: 3 g) of boric acid or 25 mL (pediatric: 15 mL) of 50% acetic acid as preservative at start of collection.
- Collect urine for 24 hours.

Additional Information: See [Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens](#) for multiple collections.

Forms

Urine Preservative Collection Options

Note: The addition of preservative must occur prior to beginning the collection.

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

Specimen Minimum Volume

3 mL

Reject Due To

Gross hemolysis	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	28 days	
	Frozen	90 days	
	Ambient	28 days	

Clinical & Interpretive

Clinical Information

Pheochromocytoma is a rare, though potentially lethal, tumor of chromaffin cells of the adrenal medulla that produces episodes of hypertension with palpitations, severe headaches, and sweating (spells). Patients with pheochromocytoma may also be asymptomatic and present with sustained hypertension or an incidentally discovered adrenal mass.

Pheochromocytomas and other tumors derived from neural crest cells (eg, paragangliomas and neuroblastomas) secrete

catecholamines (epinephrine, norepinephrine, and dopamine). Dopamine secreting tumors are rarer than norepinephrine and epinephrine secreting tumors.

3-Methoxytyramine (3MT), metanephrine, and normetanephrine are the metabolites of dopamine, epinephrine, and norepinephrine, respectively. These metabolites are further metabolized to vanillylmandelic acid. Pheochromocytoma cells also have the ability to oxymethylate catecholamines into metanephrines that are secreted into circulation.

This test may be used as the first test for low-suspicion cases and as a confirmatory study in patients with less than a 2-fold elevation in plasma free fractionated catecholamines. This is highly desirable, as the very low population incidence rate of pheochromocytoma (<1:100,000 population per year) will otherwise result in large numbers of unnecessary, costly, and sometimes risky imaging procedures.

Reference Values

Males: < or =306 mcg/24 hours

Females: < or =242 mcg/24 hours

Interpretation

Further clinical investigation (eg, radiographic studies) and genetic studies are warranted in patients whose 3-methoxytyramine (3MT) levels are elevated and there is a very high clinical index of suspicion.

Increased 3MT levels are found in patients with pheochromocytoma and dopamine-secreting tumors.

3MT levels of 306 mcg/24 hours or less in males and 242 mcg/24 hours or less in females can be detected in non-pheochromocytoma hypertensive patients.

Cautions

This test utilizes a liquid chromatography/tandem mass spectrometry (LC-MS/MS) method and is not affected by the interfering substances that affected older spectrophotometric (Pisano reaction) methods (ie, diatrizoate, chlorpromazine, hydrazine derivatives, imipramine, monoamine oxidase [MAO] inhibitors, methyldopa, phenacetin, ephedrine, or epinephrine) or acetaminophen in high-performance liquid chromatography (HPLC) methods.

This method is not subject to the known interference of acetaminophen (seen with the plasma metanephrine HPLC-electrochemical detection method).

Clinical Reference

1. van Duinen N, Corssmit EPM, de Jong WHA, Brookman D, Kema IP, Romijn JA: Plasma levels of free metanephrines and 3-methoxytyramine indicate a higher number of biochemically active HNPGL than 24-h urinary excretion rates of catecholamines and metabolites. *Eur J Endocrinol*. 2013 Aug 28;169(3):377-382. doi: 10.1530/EJE-13-0529
2. van Duinen N, Steenvoorden D, Kema IP, et al: Increased urinary excretion of 3-methoxytyramine in patients with head and neck paragangliomas. *J Clin Endocrinol Metab*. 2010 Jan;95(1):209-214. doi: 10.1210/jc.2009-1632
3. Kantorovich V, Pacak K: Interest of urinary dosage of 3- methoxytyramine in the diagnosis of pheochromocytoma and paraganglioma: report of 28 cases. *Ann Clin Biol*. 2011;69(5):555-559. doi: 10.1684 /abc.2011.0612
4. Muskiet FA, Thomasson CG, Gerding AM, Fremouw-Ottevangers DC, Nagel GT, Wolthers BG: Determination of catecholamines and their 3-O-methylated metabolites in urine by mass fragmentography with use of deuterated internal standards. *Clin Chem*. 1979 Mar;25(3):453-460
5. Shen Y, Cheng L: Biochemical diagnosis of pheochromocytoma and paraganglioma. In: Mariani-Costantini R, ed.

Paraganglioma: A Multidisciplinary Approach. Codon Publications; 2019. doi: 10.15586/paraganglioma.2019.ch2.
Accessed: April 2020. Available at: www.ncbi.nlm.nih.gov/books/NBK543224/

Performance

Method Description

Urinary 3-methoxytyramine (3MT) is determined by reverse-phase liquid chromatography-tandem mass spectrometry (LC-MS/MS) stable isotope dilution analysis.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

3 to 5 days

Specimen Retention Time

2 weeks

Performing Laboratory Location

Rochester

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

82542

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
3MT	3-Methoxytyramine, 24h, U	32618-1

Result ID	Test Result Name	Result LOINC® Value
65157	3-Methoxytyramine, U	32618-1
TM120	Collection Duration	13362-9
VL120	Urine Volume	3167-4