Test Definition: 3MT

3-Methoxytyramine, 24 Hour, Urine

Overview

Useful For

A first- and second-tier 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:
1. Complete 24-hour urine collections are preferred, especially for patients with episodic hypertension; ideally the collection should begin at the onset of a "spell."
2. 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**.
3.Collect urine for 24 hours..

Additional Information: See Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens for multiple collections.

Forms

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

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	No
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	
	Ambient	21 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Pheochromocytomas and paragangliomas (Pheo/PGL) are rare, usually benign, tumors of chromaffin cells in the adrenal medulla or paragangliomas (estimated population prevalence rates of 1 in 200,000 with a yearly incidence rate of 1-2/1000), that are potentially lethal, because they secrete excessive, uncontrolled amounts of catecholamines (dopamine, epinephrine, and norepinephrine) resulting in often severe hypertension and many cardiac abnormalities. A subgroup of these patients will also suffer tumor recurrence and sometimes malignant behavior. Untreated, these

tumors have substantial morbidity and mortality.

Key symptoms are episodes of hypertension with palpitations, severe headaches, and sweating (spells). However, some patients might be asymptomatic, have mild symptoms that might be missed, or have sustained hypertension, which is frequently observed in these patients. Finally, due to the high frequency of medical imaging for unrelated ailments, increasing numbers of occult small adrenal tumors are often incidentally discovered, some of which might be Pheo/PGLs.

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, which are secreted into circulation and urine. 3-MT is only elevated in a small proportion of patients with Pheo/PGL. Because of its low levels, testing is performed using only 24-hour urine specimens at this time, while epinephrine, and norepinephrine can be measured in plasma or 24-hour urine specimens.

An early childhood malignancy that arises from immature neuroendocrines in the adrenals, called neuroblastoma, shares many features of Pheo/PGL but has the added threat of a high malignancy rate; however, there are also frequent spontaneous remissions, particular in very young infants. Biochemical testing for neuroblastoma differs from Pheo/PGL because of many specific issues in testing infants and young children, using urine tests rather than blood tests.

For all Pheo/PGL, the preferred initial testing is by plasma metanephrine testing, as it has the highest clinical sensitivity thus facilitating ruling out Pheo/PGL if the test results are within the healthy population reference range. However, in potentially familial cases or monitoring of treated patients, some additional and repeated testing may be required.

Testing for 24-hour urine metanephrine plus urinary catecholamine levels may be used 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 Pheo/PGL (<1:200,000 population per year) will otherwise result in large numbers of unnecessary, costly, and sometimes risky imaging procedures.

Finally, familial Pheo/PGL probably accounts for a higher proportion of cases than previously thought; at least 30% are now believed to be familial. The corollary of this is that about 20 to 30 seemingly sporadic cases are likely familial. Given these statistics, genetic testing for index cases and family members should be considered.

Treatment consists of surgical tumor removal after pharmaceutical alpha-adrenergic blockade, which may be supplemented with beta blockade once the alpha blockade has been established. This preparation is aimed to prevent massive catecholamine surges during surgery.

Reference Values

Males: < or =306 mcg/24 h

Females: < or =242 mcg/24 h

For International System of Units (SI) conversion for Reference Values, see
www.mayocliniclabs.com/order-tests/si-unit-conversion.html

Interpretation

Further clinical investigation (eg, radiographic studies) and genetic studies might be warranted in patients whose 3-methoxytyramine (3MT), metanephrine, or normetanephrine are elevated or when 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 h or less in male patients and 242 mcg/24 h or less in female patients can be detected in non-pheochromocytoma hypertensive patients.

Cautions

Tricyclic antidepressants, labetalol, and sotalol medications may elevate levels of metanephrines producing results that cannot be interpreted. If clinically feasible, it is optimal to discontinue these medications at least 1 week before collection.

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

Clinical Reference

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2. Taylor RL, Singh RJ: Validation of liquid chromatography-tandem mass spectrometry method for analysis of urinary conjugated metanephrine and normetanephrine for screening of pheochromocytoma. Clin Chem 2002;48:533-539
3. Roden M, Raffesberg W, Raber W, et al. Quantification of unconjugated metanephrines in human plasma without interference by acetaminophen. Clin Chem. 2001;47(6):1061-1067
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7. Lam L, Woollard, GA Teague L, Davidson, JS. Clinical validation of urine 3-methoxytyramine as a biomarker of neuroblastoma and comparison with other catecholamine-related biomarkers. Ann Clin Biochem. 2017;54(2) 264-272
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10. Mubarik A, Adeddula NR. Chromaffin Cell Cancer. In: StatPearls [Internet]. StatPearls Publishing; May 8, 2023. Accessed April 22, 2024. Available at www.ncbi.nlm.nih.gov/books/NBK535360/

Performance

Method Description
Urinary 3-methoxytyramine is determined by reverse-phase liquid chromatography tandem mass spectrometry with 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
Mayo Clinic Laboratories - Rochester Superior Drive

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 (h)	13362-9

VL120	Volume (mL)	3167-4