MAYO CLINIC LABORATORIES

Test Definition: MNU

Manganese, 24 Hour, Urine

Overview

Useful For

Monitoring manganese exposure using 24 hour urine collections

Nutritional monitoring

Special Instructions

- Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens
- Metals Analysis Specimen Collection and Transport

Method Name

Triple-Quadrupole Inductively Coupled Plasma-Mass Spectrometry (ICP-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Urine

Necessary Information

24-Hour volume (in milliliters) is required.

Specimen Required

Patient Preparation: High concentrations of gadolinium and iodine are known to potentially interfere with most inductively coupled plasma mass spectrometry-based metal tests. If either gadolinium- or iodine-containing contrast media has been administered, **a specimen should not be collected for 96 hours.**
Supplies: Urine Tubes, 10 mL (T068)
Collection Container/Tube: Clean, plastic urine container with no metal cap or glued insert
Submission Container/Tube: Plastic, 10-mL urine tube or clean, plastic aliquot container with no metal cap or glued insert
Specimen Volume: 0.8 mL
Collection Instructions:
1. Collect urine for 24 hours.
2. Within 4 hours of completion of 24-hour collection, refrigerate specimen.
3. See Metals Analysis Specimen Collection and Transport for complete instructions.
Additional Information: See Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens for multiple collections.

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

Specimen Minimum Volume

0.4 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	
	Ambient	7 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Manganese (Mn) is a trace essential element with many industrial uses. Mining as well as iron and steel production have been implicated as occupational sources of exposure. It is principally used in steel production to improve hardness, stiffness, and strength. Mn is a normal constituent of air, soil, water, and food. The primary nonoccupational source of exposure is by eating food or Mn-containing nutritional supplements. Vegetarians who consume foods rich in Mn such as grains, beans, and nuts, as well as heavy tea drinkers, may have a higher intake than the average person. People who smoke tobacco or inhale second-hand smoke are also exposed to Mn at higher levels than nonsmokers.

Inhalation is the primary source of entry for Mn but is also partially absorbed (3%-5%) through the gastrointestinal tract. Only very small amounts of Mn are absorbed dermally. Signs of toxicity may appear quickly, and neurological symptoms are rarely reversible. Mn toxicity is generally recognized to progress through 3 stages. Levy describes these stages. "The first stage is a prodrome of malaise, somnolence, apathy, emotional lability, sexual dysfunction, weakness, lethargy, anorexia, and headaches. If there is continued exposure, progression to a second stage may occur, with psychological

disturbances, including impaired memory and judgement, anxiety, and sometimes psychotic manifestations such as hallucinations. The third stage consists of progressive bradykinesia, dysarthria, axial and extremity dystonia, paresis, gait disturbances, cogwheel rigidity, intention tremor, impaired coordination, and a mask-like face. Many of those affected may be permanently and completely disabled."(1) Mn is removed from the blood by the liver where it's conjugated with bile and excreted.

As listed in the United States National Agriculture Library, Mn adequate intake is 1.6 to 2.3 mg/day for adults. This level of intake is easily achieved without supplementation by a diverse diet including fruits and vegetables, which have higher amounts of Mn than other food types. Patients on a long-term parenteral nutrition should receive Mn supplementation and should be monitored to ensure that circulatory levels of Mn are appropriate.

Reference Values

0-17 years: Not established
> or =18 years: <4.0 mcg/24 h

Interpretation

Manganese (Mn) in urine represents the excretion of excess Mn from the body. Elevated levels may indicate occupational exposure or excessive nutritional intake.

Specimens from normal individuals have very low levels of Mn.

Cautions

Normal specimens have extremely low levels of Mn; therefore, elevated results could easily be a result of external contamination. Precautions must be taken to ensure the specimen is not contaminated. Metal-free urine collection procedures must be followed.

Clinical Reference

1. Levy BS, Nassetta WJ. Neurologic effects of manganese in humans: A review. Int J Occup Environ Health. 2003;9(2):153-163. doi:10.1179/oeh.2003.9.2.153
2. Paschal DC, Ting BG, Morrow JC, et al. Trace metals in urine of United States residents: reference range concentrations. Environ Res. 1998;76(1):53-59. doi:10.1006/enrs.1997.3793
3. Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds: Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023

Performance

Method Description

The metal of interest is analyzed by triple-quadrupole inductively coupled plasma mass spectrometry.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday

Report Available
2 to 8 days

Specimen Retention Time
14 days

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
83785

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
MNU	Manganese, 24 Hr, U	8203-2

Result ID	Test Result Name	Result LOINC® Value
8080	Manganese, 24 Hr, U	8203-2
TM26	Collection Duration (h)	13362-9
VL24	Volume (mL)	3167-4