Test Definition: MNRCU

Manganese/Creatinine Ratio, Random, Urine

Overview

Useful For

Monitoring manganese exposure using random urine specimens

Nutritional monitoring

Clinical trials

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
MNCU	Manganese/Creat Ratio, U	No	Yes
CRETR	Creatinine, Random, U	No	Yes

Special Instructions

- Metals Analysis Specimen Collection and Transport

Method Name

MNCU: Triple-Quadrupole Inductively Coupled Plasma Mass Spectrometry (ICP-MS/MS)
CRETR: Enzymatic Colorimetric Assay

NY State Available

Yes

Specimen

Specimen Type

Urine

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 collection 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: 3 mL
Collection Instructions:

1. Collect a random urine specimen.
2. See Metals Analysis Specimen Collection and Transport for complete instructions.

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	
	Ambient	7 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Manganese (Mn) is an essential trace element with many industrial uses. Mn is the 12th most abundant element in the earth's crust and is used predominantly in the production of steel. These industrial processes cause elevated environmental exposures to airborne Mn dust and fumes, which in turn have led to well-documented cases of neurotoxicity among exposed workers. Mining as well as iron and steel production have been implicated as sources of exposure.

Inhalation is the primary source of entry for Mn toxicity. Signs of toxicity may appear quickly or not at all; 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 judgment, 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)

Few cases of Mn deficiency or toxicity due to ingestion have been documented. Only 1% to 3% Mn is absorbed via ingestion, while most of the remaining Mn is excreted in the feces. 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 long-term parenteral nutrition should receive Mn supplementation and should be monitored to ensure that circulatory levels of Mn are appropriate.

Reference Values

MANGANESE

0-17 years: Not established

> or =18 years: <4.0 mcg/g creatinine

CREATININE, RANDOM
0-17 years: Not established
> or =18 years old: 16-326 mg/dL

Interpretation
Manganese in urine represents the excretion of excess manganese from the body and may be used to monitor exposure or excessive nutritional intake.

Cautions
Specimens collected from healthy, unexposed adults have extremely low levels of manganese. Because of the high environmental concentration of manganese, contamination is always a possibility when considering elevated results. 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
4. O'Neal SL, Zheng W. Manganese toxicity upon overexposure: a decade in review. Curr Environ Health Rep. 2015;2(3):315-328. doi:10.1007/s40572-015-0056-x

Performance

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

Creatinine
The enzymatic method is based on the determination of sarcosine from creatinine with the aid of creatininase, creatinase, and sarcosine oxidase. The liberated hydrogen peroxide is measured via a modified Trinder reaction using a colorimetric indicator. Optimization of the buffer system and the colorimetric indicator enables the creatinine concentration to be quantified both precisely and specifically.(Package insert: Creatinine plus ver 2. Roche Diagnostics; V15.0, 03/2019)

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
82570
83785

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
MNRCU	Manganese/Creat Ratio, Random, U	27367-2

Result ID	Test Result Name	Result LOINC® Value
CRETR	Creatinine, Random, U	2161-8
614994	Manganese/Creat Ratio, U	27367-2