

## Overview

### Useful For

Monitoring manganese exposure using serum specimens

Nutritional monitoring

### Special Instructions

- [Trace Metals Analysis Specimen Collection and Transport](#)

### Method Name

Dynamic Reaction Cell-Inductively Coupled Plasma-Mass Spectrometry (DRC-ICP-MS)

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Specimen Required

**Patient Preparation:** High concentrations of gadolinium, iodine, and barium are known to interfere with most metals tests. If gadolinium-, iodine, or barium-containing contrast media has been administered, a specimen should not be collected for 96 hours.

### Supplies:

-Metal Free B-D Tube (No Additive), 6 mL (T184)

-Metal Free Specimen Vial (T173)

**Collection Container/Tube:** Plain, royal blue-top Vacutainer plastic trace element blood collection tube

**Submission Container/Tube:** 7-mL Mayo metal-free, screw-capped, polypropylene vial

**Specimen Volume:** 1.6 mL

### Collection Instructions:

1. Allow the specimen to clot for 30 minutes, and then centrifuge to separate serum from the cellular fraction. Serum must be removed from cellular fraction within 4 hours of draw. Avoid hemolysis.
2. Remove the stopper. Carefully pour specimen into a Mayo metal-free, polypropylene vial, while avoiding transfer of the cellular components of blood. **Do not** insert a pipet into the serum to accomplish transfer, and **do not** ream the specimen with a wooden stick to assist with serum transfer.
3. See [Trace Metals Analysis Specimen Collection and Transport](#) in Special Instructions for complete instructions.

**Specimen Minimum Volume**

0.4 mL

**Reject Due To**

|                 |        |
|-----------------|--------|
| Gross hemolysis | Reject |
| Gross lipemia   | OK     |
| Gross icterus   | OK     |

**Specimen Stability Information**

| Specimen Type | Temperature              | Time    | Special Container |
|---------------|--------------------------|---------|-------------------|
| Serum         | Refrigerated (preferred) | 28 days | METAL FREE        |
|               | Ambient                  | 28 days | METAL FREE        |
|               | Frozen                   | 28 days | METAL FREE        |

**Clinical and Interpretive**
**Clinical Information**

Manganese (Mn) is a trace essential element with many industrial uses. Mining and 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 non-occupational 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 non-smokers.

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, dysarthric 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 is 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**

&lt;2.4 ng/mL

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Reference values have not been established for patients that are <18 years of age.

**Interpretation**

Serum manganese results above the reference values suggest recent exposure.

**Cautions**

Specimens collected from healthy, unexposed adults have extremely low levels of manganese (Mn). Because of the high environmental concentration of Mn, contamination is always a possibility when considering elevated results. Precautions must be taken to ensure the specimen is not contaminated. Metal-free serum collection procedures must be followed and centrifuged serum must be aliquoted into an acid-washed Mayo metal-free vial.

**Clinical Reference**

1. Levy BS, Nassetta WJ: Neurologic effects of Manganese in humans: A review. Int J Occup Environ Health Apr/Jun 2003;9(2):153-163
2. Chiswell B, Johnson D: Manganese: In Handbook on Metals in Clinical and Analytical Chemistry. Edited by HG Sigel, H Sigel. Marcel Dekker, Inc, New York, 1994, pp 479-494
3. Finley J, Davis C: Manganese deficiency and toxicity: Are high or low dietary amounts of manganese cause for concern? Biofactors 1999;10:15-24

**Performance****Method Description**

Manganese in serum is analyzed by inductively coupled plasma-mass spectrometry in dynamic reaction cell mode using gallium as an internal standard and a salt matrix calibration.(Unpublished Mayo method)

**PDF Report**

No

**Day(s) and Time(s) Test Performed**

Tuesday, Friday; 8 a.m.

**Analytic Time**

1 day

**Maximum Laboratory Time**

6 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.

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- 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 U.S. Food and Drug Administration.

**CPT Code Information**

83785

**LOINC® Information**

| Test ID | Test Order Name | Order LOINC Value |
|---------|-----------------|-------------------|
| MNS     | Manganese, S    | 5683-8            |

| Result ID | Test Result Name | Result LOINC Value |
|-----------|------------------|--------------------|
| 8413      | Manganese, S     | 5683-8             |