MAYO CLINIC LABORATORIES

Test Definition: MOLPS

Molybdenum, Serum

Overview

Useful For

Monitoring of parenteral nutrition

Monitoring metallic prosthetic implant wear

As an indicator of molybdenum cofactor deficiency

Special Instructions

- Metals Analysis Specimen Collection and Transport

Method Name

Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

NY State Available

Yes

Specimen

Specimen Type

Serum

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 at least 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: 0.25 mL Serum

Collection Instructions:

1. Allow specimen to clot for 30 minutes; then centrifuge the specimen to separate serum from the cellular fraction.
2. Remove the stopper. Carefully pour specimen into a Mayo metal-free, polypropylene vial, 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 Metals Analysis Specimen Collection and Transport for complete instructions.

Specimen Minimum Volume

See Specimen Required

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	METAL FREE
	Ambient	14 days	METAL FREE
	Frozen	14 days	METAL FREE

Clinical & Interpretive

Clinical Information

Molybdenum is an essential trace element found in the daily diet. It is a cofactor for some enzymes important in nitrogen metabolism (aldehyde dehydrogenase, xanthine oxidase, nicotinamide adenine dinucleotide dehydrogenase). Due to the wide distribution of molybdenum in the environment and particularly in plant materials, molybdenum deficiency is rare in adults with normal, diverse diets. Typical molybdenum intake in most geographic locations is between 45 and 90 mcg/day. Urine is the primary source of excretion, though excesses are sometimes excreted by the biliary route.

Molybdenum deficiency associated with parenteral nutrition is indicated by symptoms such as stunted growth, reduced appetite, tachycardia, tachypnea, blindness, and coma. These symptoms can be corrected by introducing molybdenum supplementation. Molybdenum cofactor disease is a severe genetic disorder that is due to disease-causing variants in the *MOCS1*, *MOCS2*, and *GEPH* genes.

Molybdenum toxicity is rare and usually related to molybdenum mining exposure; however, it has been observed in cases of intake above 400 mcg/day. Molybdenum interferes with copper uptake; molybdenum toxicity is predominantly due to copper deficiency (hypochromic anemia and neutropenia) and inhibition of xanthine oxidase (uric acid accumulation).

Serum molybdenum concentrations are likely to be increased above the reference range in patients with metallic joint prosthesis. Prosthetic devices produced by Depuy Company, Dow Corning, Howmedica, LCS (low contact stress), PCA (porous-coated anatomic), Osteonics, Richards Company, Tricon, and Whiteside are typically made of chromium, cobalt, and molybdenum. This list of products is incomplete, and these products change occasionally; see prosthesis product information for each device for composition details.

Reference Values

0.3-2.0 ng/mL

Interpretation

Prosthesis wear is known to result in increased circulating concentrations of metal ions.(1) Serum concentrations above 10 ng/mL in a patient with molybdenum-based implant suggest significant prosthesis wear. Increased serum trace element concentrations in the absence of corroborating clinical information do not independently predict prosthesis wear or failure.

Serum molybdenum levels below 0.3 ng/mL indicate potential deficiency.

Increased serum molybdenum may be seen in acute viral hepatitis, chronic active hepatitis, alcoholic liver disease, and other forms of liver inflammation.

Cautions

No significant cautionary statements

Clinical Reference

1. Witzleb WC, Ziegler J, Krummenauer F, Neumeister V, Guenther KP. Exposure to chromium, cobalt and molybdenum from metal-on-metal total hip replacement and hip resurfacing arthroplasty. Acta Orthop. 2006;77(5):697-705
2. National Center for Environmental Health, National Health and Nutrition Examination Survey. The Third National Report on Human Exposure to Environmental Chemicals (NHANES). NCEH Publication 05-0570. Centers for Disease Control and Prevention; July 2005. Available at https://stacks.cdc.gov/view/cdc/21809
3. Yoshida M, Ota S, Fukunaga K, Nishivama T. Serum molybdenum concentration in healthy Japanese adults determined by inductively coupled plasma-mass spectrometry. J Trace Elem Med Biol. 2006;20(1):19-23
4. Reiss J, Johnson JL. Mutations in the molybdenum cofactor biosynthetic genes MOCS1, MOCS2, and GEPH. Hum Mutat. 2003;21(6):569-576
5. Sodi R. Vitamins and trace elements. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 39

Performance

Method Description

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

PDF Report

No

Day(s) Performed

Wednesday

Report Available

1 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

83018

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
MOLPS	Molybdenum, S	5698-6

Result ID	Test Result Name	Result LOINC® Value
89270	Molybdenum, S	5698-6