MAYO CLINIC LABORATORIES

Test Definition: MOLPS

Molybdenum, S

Overview

Useful For

Monitoring of parenteral nutrition
Monitoring metallic prosthetic implant wear
As an indicator of molybdenum cofactor disease

Special Instructions

- Trace Metals Analysis Specimen Collection and Transport

Method Name

InductivelyCoupledPlasma-MassSpectrometry(ICP-MS)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Patient Preparation: High concentrations of gadolinium and iodine are known to interfere with most metals tests. If either gadolinium- or iodine-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 (T184)

Submission Container/Tube: 7-mL Mayo metal-free, screw-capped, polypropylene vial (T173)

Specimen Volume:1.6 mL

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 Trace Metals Analysis Specimen Collection and Transport in Special Instructions for complete instructions.

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Minimum Volume

0.4 mL

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, NADH 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 defective mutations 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, PCA, Osteonics, Richards Company, Tricon, and Whiteside, typically are 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, et al: 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. Third National Report on Exposure to Environmental Chemicals (NHANES). NCEH Publication 05-0570. Department of Human Service, Centers for Disease Control and Prevention. July 2005
3. Shenkin A, Baines M, Fell GS, Lyon TDG: Vitamins and trace elements. In Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Edited by CA Burtis, ER Ashwood, DA Bruns. Elsevier Saunders. St. Louis, 2006, p 1132
4. Yoshida M, O'ta 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
5. Reiss J, Johnson J: Mutations in the molybdenum cofactor biosynthetic genes *MOCS1*, *MOCS2*, and *GEPH*. Hum Mutat 2003;21(6):569-576

Performance

Method Description
Molybdenum (Mo) in serum is analyzed by ICP-MS in standard mode using rhodium (Rh) as an internal standard and a salt matrix calibration.(Unpublished Mayo method)

PDF Report
No

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees & Codes

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 US Food and Drug Administration.

CPT Code Information
83018