MAYO CLINIC LABORATORIES

Test Definition: SES

Selenium, Serum

Overview

Useful For
Monitoring selenium replacement therapy

Special Instructions
- 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
Serum

Specimen Required
Patient Preparation: High concentrations of gadolinium, iodine, and barium are known to potentially interfere with most inductively coupled plasma mass spectrometry-based metal tests. If either gadolinium-, iodine-, and barium containing contrast media has been administered, **a specimen should not be collected for 96 hours.**
Supplies:
-Metal Free Specimen Vial (T173)
-Metal Free B-D Tube (No Additive), 6 mL (T184)
Collection Container/Tube: 6-mL Plain, royal blue-top Vacutainer plastic trace element blood collection tube
Submission Container/Tube: 7-mL Metal-free, screw-capped, polypropylene vial
Specimen Volume: 0.8 mL serum
Collection Instructions:
1. Allow the 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 metal-free, polypropylene vial, avoid transferring the cellular components of blood. **Do not** insert a pipette 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.

Forms
If not ordering electronically, complete, print, and send General Request (T239)

Specimen Minimum Volume
Serum: 0.2 mL

Reject Due To

Gross hemolysis	OK
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 & Interpretive

Clinical Information

Selenium is an essential element; it is a cofactor required to maintain activity of glutathione peroxidase (GSH-Px), an enzyme that catalyzes the degradation of organic hydroperoxides. The absence of selenium correlates with loss of GSH-Px activity and is associated with damage to cell membranes due to accumulation of free radicals.

The normal daily dietary intake of selenium is 0.01 to 0.04 parts per million (ppm), which is similar to the typical content of soil (0.05 ppm) and sea water (0.09 ppm). Selenium is found in many over-the-counter vitamin preparations because its antioxidant activity is thought to be anticarcinogenic. There is no supporting evidence that selenium suppresses cancer.

In humans, cardiac muscle is the most susceptible to selenium deficiency. With cell membrane damage, normal cells are replaced by fibroblasts. This condition is known as cardiomyopathy and is characterized by an enlarged heart whose muscle is largely replaced by fibrous tissue.

In the United States, selenium deficiency is related to use of total parenteral nutrition. This therapy is administered to patients with no functional bowel, such as after surgical removal of the small and large intestine because of cancer or because of acute inflammatory bowel disease such as Crohn disease. Selenium supplementation to raise the serum concentration to above 70 mcg/L is the usual treatment. Serum monitoring done on a semiannual basis checks the adequacy of supplementation.

Selenium toxicity has been observed in animals when daily intake exceeds 4 ppm. Teratogenic effects are frequently noted in the offspring of animals living in regions where soil content is high in selenium such as south-central South Dakota and northern-coastal regions of California. Selenium toxicity in humans is not known to be a significant problem except in acute overdose cases. Selenium is not classified as a human teratogen.

Reference Values

0-2 months: 45-90 mcg/L

3-6 months: 50-120 mcg/L
7-9 months: 60-120 mcg/L
10-12 months: 70-130 mcg/L
13 months-17 years: 70-150 mcg/L
> or =18 years: 110-165 mcg/L

Interpretation

Selenium accumulates in biological tissue. The normal concentration in adult human serum is 110 to 165 mcg/L. Optimal selenium concentration is age dependent (see Reference Values); children require less circulating selenium than adults.

In the state of selenium deficiency associated with loss of glutathione peroxidase activity, the serum concentration is usually below 40 mcg/L.

Cautions

Selenium is quite volatile; therefore, careful specimen collection is necessary to ensure accurate results.

Severe selenium deficiency may contribute to cardiomyopathy.

Clinical Reference

1. Muntau AC, Streiter M, Kappler M, et al. Age-related reference values for serum selenium concentrations in infants and children. Clin Chem. 2002;48(3):555-560
2. Gonzalez S, Huerta JM, Fernandez S, Patterson EM, Lasheras C. Food intake and serum selenium concentration in elderly people. Ann Nutr Metab. 2006;50(2):126-131
3. Skelton JA, Havens PL, Werlin SL. Nutrient deficiencies in tube-fed children. Clin Pediatr. 2006;45(1):37-41
4. Gosney MA, Hammond MF, Shenkin A, Allsup S. Effect of micronutrient supplementation on mood in nursing home residents. Gerontology. 2008;54(5):292-299
5. Burri J, Haldimann M, Dudler V. Selenium status of the Swiss population: assessment and change over a decade. J Trace Elem Med Biol. 2008;22(2):112-119
6. Ayling RM, Crook M. Nutrition: Laboratory and clinical aspects. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:457-501

Performance

Method Description

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

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

1 to 3 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

84255

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SES	Selenium, S	5724-0

Result ID	Test Result Name	Result LOINC® Value
9765	Selenium, S	5724-0