Test Definition: CRWB

Chromium, Blood

Overview

Useful For

Monitoring exposure to chromium using whole blood specimens

Monitoring metallic prosthetic implant wear

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

Whole blood

Specimen Required

*****This specimen container cannot be opened or used for any other testing before shipping.*****

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: Metal Free EDTA 3 mL Tube (T989)

Container/Tube: Royal blue-top BD vacutainer with EDTA blood collection tube (3 mL) (T989) (BD catalog no. 367777)

Specimen Volume: 1.0 mL

Collection Instructions:

1. See Metals Analysis Specimen Collection and Transport for complete instructions.
2. Send whole blood specimen in original tube. **Do not aliquot.**

Specimen Minimum Volume

0.4 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK

Gross icterus	OK
Microtainer	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole blood	Refrigerated (preferred)	28 days	
	Ambient	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Chromium (Cr) is a naturally occurring element widely distributed in the environment. Chromium exists in several valence states with the 3 main forms being Cr, Cr(3+), and Cr(6+). Cr(3+) is an essential trace element that enhances the action of insulin. Deficiency leads to impaired growth, reduced life span, corneal lesions, and alterations in carbohydrates, lipid, and protein metabolism.

Chromium is widely used in manufacturing processes to make various metal alloys such as stainless steel. It is also used in many consumer products including wood treated with copper dichromate, leather tanned with chromic sulfate, and metal-on-metal hip replacements.

The general population is most likely to be exposed to trace levels of chromium in the food that is eaten. Low levels of Cr(3+) occur naturally in a variety of foods, such as fruits, vegetables, nuts, beverages, and meats. The highest potential occupational exposure occurs in the metallurgy and tanning industries, where workers may be exposed to high air concentrations.

Per US Food and Drug Administration recommendations, orthopedic surgeons should consider measuring and following serial chromium concentrations in EDTA anticoagulated whole blood in symptomatic patients with metal-on-metal hip implants as part of their overall clinical evaluation. Blood Cr 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

0-17 years: Not established
> or =18 years: <1.0 ng/mL

Interpretation

Results greater than the reference range indicate exposure to chromium (see Cautions about specimen collection).

Prosthesis wear is known to result in increased circulating concentration of metal ions. Increased blood trace element concentrations in the absence of corroborating clinical information do not independently predict prosthesis wear or

failure.

Cautions

Chromium is present in the environment at 100-fold to 1000-fold higher concentration than found in biological tissues. Reports of increased blood chromium could be due to external contamination. Metal-free blood collection procedures must be followed.

Clinical Reference

1. Vincent JB. Elucidating a biological role for chromium at a molecular level. Acc Chem Res. 2000;33(7):503-510
2. Centers for Disease Control and Prevention; National Institute for Occupational Safety and Health (NIOSH): Criteria for a recommended standard occupational exposure to hexavalent chromium. CDC; September 2013. Accessed June 4, 2025. Available at www.cdc.gov/niosh/docs/2013-128/pdfs/2013_128.pdf
3. Keegan GM, Learmonth ID, Case CP. A systematic comparison of the actual, potential, and theoretical health effects of cobalt and chromium exposures from industry and surgical implants. Crit Rev Toxicol. 2008;38(8):645-674
4. Tower SS. Arthroprosthetic cobaltism: Neurological and cardiac manifestations in two patients with metal-on-metal arthroplasty: A case report. J Bone Joint Surg Am. 2010;92(17):2847-2851
5. US Food and Drug Administration: Information about Soft Tissue Imaging and Metal Ion Testing. FDA; Updated March 15, 2019. Accessed June 4, 2025. Available at: www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ImplantsandProsthetics/MetalonMetalHipImplants/ucm331971.htm
6. US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry: Toxicology profile for chromium. HHS; September 2012. Accessed June 4, 2025. Available at www.atsdr.cdc.gov/ToxProfiles/tp7.pdf
7. Sodi R. Vitamins and trace elements. Rifai N, Chiu RWK, Young I, eds: Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 39.
8. Eliaz N. Corrosion of metallic biomaterials: A review. Materials (Basel). 2019;12(3):407. doi:10.3390/ma12030407

Performance

Method Description

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

PDF Report

No

Day(s) Performed

Tuesday through Friday

Report Available

1 to 5 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

82495

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CRWB	Chromium, B	5619-2

Result ID	Test Result Name	Result LOINC® Value
65601	Chromium, B	5619-2