MAYO CLINIC LABORATORIES

Test Definition: CRCRU

Chromium/Creatinine Ratio, Random, Urine

Overview

Useful For

Detecting chromium exposure

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
CRCRR	Chromium/Creat Ratio, U	No	Yes
CRETR	Creatinine, Random, U	No	Yes

Special Instructions

- Metals Analysis Specimen Collection and Transport

Method Name

CRCRR: Triple-Quadrupole Inductively Coupled Plasma Mass Spectrometry (ICP-MS/MS)

CRETR: Enzymatic Colorimetric Assay

NY State Available

Yes

Specimen

Specimen Type

Urine

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 96 hours.**

Supplies: Urine Tubes, 10 mL (T068)

Collection Container/Tube: Clean, plastic urine container with no metal cap or glued insert

Submission Container/Tube: Plastic vial or clean, plastic aliquot container with no metal cap or glued insert

Specimen Volume: 3 mL

Collection Instructions:

1. Collect a random urine specimen.
2. See Metals Analysis Specimen Collection and Transport for complete instructions.

Specimen Minimum Volume

2 mL

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	28 days	
	Ambient	14 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Chromium (Cr) has an atomic mass of 51.996, atomic number 24, and valences ranging from 2(-) to 6(+). Hexavalent chromium, Cr(6+), and trivalent chromium, Cr(3+), are the two most prevalent forms. Cr(3+) is the only oxidation state present under normal physiologic conditions. Cr(6+) is widely used in industry to make chromium alloys including stainless steel pigments and electroplated coatings. Cr(6+), a known carcinogen, is rapidly metabolized to Cr(3+). Cr(3+) is the only form present in human urine.

Reference Values

CHROMIUM/CREATININE RATIO
0-17 years: Not established
>17 years: <0.8 mcg/g Creatinine

CREATININE, RANDOM
> or =18 years old: 16-326 mg/dL
Reference values have not been established for patients who are younger than 18 years of age.

Interpretation

Chromium is principally excreted in the urine. Results greater than the reference range indicate either recent exposure to chromium or specimen contamination during collection.

The National Institute for Occupational Safety and Health document on occupational exposure reviews the data supporting use of urine to assess chromium exposure. The biological exposure index (BEI) for total chromium in urine measured at the end of the shift at the end of the workweek is 25 mcg/L. The BEI for the increase in total chromium during a shift is 10 mcg/L. A test for this specific purpose (CRUO / Chromium Occupational Exposure, Random, Urine) is available.

Cautions

Normal specimens have extremely low levels of chromium; elevated results could easily be a result of external contamination. Precautions must be taken to ensure the specimen is not contaminated. Metal-free urine collection procedures must be followed. Refrigeration is preferred over chemical methods of preservation.

Specimen collection procedures for chromium require special specimen collection tubes, rigorous attention to ultraclean specimen collection and handling procedures, and analysis in an ultraclean facility. Unless all of these precautions are taken, elevated urine chromium results may be an incidental and misleading finding.

Clinical Reference

1. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Toxicology profile for chromium. HHS; September 2012. Accessed March 18, 2026. Available at www.atsdr.cdc.gov/ToxProfiles/tp7.pdf
2. Sodi R. Vitamins and trace elements. In: Rifai N, Chiu RWK, Young I, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 39
3. 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 March 18, 2026. Available at www.cdc.gov/niosh/docs/2013-128/pdfs/2013_128.pdf
4. Gianello G, Masci O, Carelli G, Vinci F, Castellino N. Occupational exposure to chromium-an assessment of environmental pollution levels and biological monitoring of exposed workers. Ind Health. 1998;36(1):74-77. doi: 10.2486/indhealth.36.74
5. Eliaz N. Corrosion of metallic biomaterials: A review. Materials (Basel). 2019;12(3):407. doi:10.3390/ma12030407
6. US Food and Drug Administration. Information about Soft Tissue Imaging and Metal Ion Testing. FDA; Updated March 15, 2019. Accessed March 18, 2026. Available at: www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ImplantsandProsthetics/MetalonMetalHipImplants/ucm331971.htm

Performance

Method Description

Chromium

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

Creatinine

The enzymatic method is based on the determination of sarcosine from creatinine with the aid of creatininase, creatinase, and sarcosine oxidase. The liberated hydrogen peroxide is measured via a modified Trinder reaction using a colorimetric indicator. Optimization of the buffer system and the colorimetric indicator enables the creatinine concentration to be quantified both precisely and specifically.(Package insert: Creatinine plus ver 2. Roche Diagnostics; V15.0, 03/2019)

PDF Report

No

Day(s) Performed

Monday

Report Available

2 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

82495
82570

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CRCRU	Chromium/Creat Ratio, Random, U	13464-3

Result ID	Test Result Name	Result LOINC® Value
CRETR	Creatinine, Random, U	2161-8
607759	Chromium/Creat Ratio, U	13464-3