Test Definition: CRU

Chromium, 24 Hr, U

Overview

Useful For

Screening for occupational exposure to chromium

Monitoring metallic prosthetic implant wear

Special Instructions

- Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens
- Trace Metals Analysis Specimen Collection and Transport

Method Name

Dynamic Reaction Cell-Inductively Coupled Plasma-Mass Spectrometry (DRC-ICP-MS)

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

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

Submission Container/Tube: Plastic, 10-mL urine tube (T068) or clean, plastic aliquot container with no metal cap or glued insert

Specimen Volume: 10 mL

Collection Instructions:

1. Collect urine for 24 hours.

2. Refrigerate specimen within 4 hours of completion of 24-hour collection.

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

Additional Information:

1. 24-Hour volume is required.

2. SeeUrine Preservatives-Collection and Transportation for 24-Hour Urine Specimens inSpecial Instructions for multiple collections.

3. 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.

Urine Preservative Collection Options

Note: The addition of preservative or application of temperature controls **must occur within 4 hours of completion** of the collection.

Ambient	Yes
Refrigerate	Preferred
Frozen	Yes
50% Acetic Acid	No
Boric Acid	No
Diazolidinyl Urea	No
6M Hydrochloric Acid	No
6M Nitric Acid	No
Sodium Carbonate	No
Thymol	No
Toluene	No

Specimen Minimum Volume

0.4 mL

Reject Due To

Hemolysis	NA
Lipemia	NA
Icterus	NA
Other	NA

Specimen Stability Information

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

Clinical and Interpretive

Clinical Information

Chromium (Cr) exists in valence states ranging from 2(-) to 6(+). Hexavalent chromium (Cr[+6]) and trivalent chromium (Cr[+3]) are the 2 most prevalent forms. Cr(+6) is used in industry to make chromium alloys including stainless steel, pigments, and electroplated coatings. Cr(+6), a known carcinogen, is immediately converted to Cr(+3) upon exposure to biological tissues. Cr(+3) is the only chromium species found in biological specimens.

Urine chromium 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 Whitesidetypically 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

0-15 years: not established

> or =16 years: 0.0-7.9 mcg/specimen

Interpretation

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

Prosthesis wear is known to result in increased circulating concentration of metal ions. Modest increase (8-16 mcg/24 hour) in urine chromium concentration is likely to be associated with a prosthetic device in good condition. Urine concentrations >20 mcg/24 hour in a patient with chromium-based implant suggest significant prosthesis wear. Increased urine trace element concentrations in the absence of corroborating clinical information do not independently predict prosthesis wear or failure.

The National Institute for Occupational Safety and Health (NIOSH) draft document on occupational exposure reviews the data supporting use of urine to assess chromium exposure. They recommend a Biological Exposure Index of 10 mcg/g creatinine and 30 mcg/g creatinine for the increase in urinary chromium concentrations during a work shift and at the end of shift at the end of the workweek, respectively. A test for this specific purpose (CHROMU / Chromium for Occupational Monitoring, Urine) is available.

Cautions

Normal specimens have extremely low levels of chromium; because of the ubiquitous nature 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 (see Trace Metals Analysis Specimen Collection and Transport in Special Instructions).

Refrigeration is preferred over chemical methods of preservation.

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.

Clinical Reference

1. Vincent JB: Elucidating a biological role for chromium at a molecular level. Acc Chem Res 2000 July;33(7):503-510

2. NIOSH Hexavalent Chromium Criteria Document Update, September 2008; Available from URL: http://www.cdc.gov/niosh/topics/hexchrom/

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;38:645-674

Performance

Method Description

Chromium (Cr) in serum and urine is analyzed by ICP-MS in DRC mode using rhodium (Rh) as an internal standard and a salt matrix calibration. (Unpublished Mayo method)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday, Wednesday, Friday; 8 a.m

Analytic Time

1 day

Maximum Laboratory Time

4 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information

82495

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
CRU	Chromium, 24 Hr, U	5624-2

Result ID	Test Result Name	Result LOINC Value
8593	Chromium, 24 Hr, U	5624-2
TM44	Collection Duration	13362-9
VL42	Urine Volume	3167-4
45492	Chromium Concentration	21201-9