Overview

Useful For
Screening for occupational exposure to chromium
Monitoring metallic prosthetic implant wear

Special Instructions
- Trace Metals Analysis Specimen Collection and Transport

Method Name
Dynamic Reaction Cell-Inductively Coupled Plasma-Mass Spectometry (DRC-ICP-MS)

NY State Available
Yes

Specimen

Specimen Type
Urine

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.

Collection Container/Tube: Clean, plastic urine collection container

Submission Container/Tube: Plastic, 6 mL tube (T465) or a clean, plastic aliquot container with no metal cap or glued insert

Specimen Volume: 2 mL

Collection Instructions:
1. Collect a random urine specimen.
2. See Trace Metals Analysis Specimen Collection and Transport in Special Instructions for complete instructions.

Specimen Minimum Volume
0.4 mL

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

Specimen Stability Information
Test Definition: CR
Chromium, Random, U

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<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<td>Urine</td>
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<tr>
<td></td>
<td>Ambient</td>
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<tr>
<td></td>
<td>Frozen</td>
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**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 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**
No established reference values

**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/L) in urine chromium concentration is likely to be associated with a prosthetic device in good condition. Urine concentrations >20 mcg/L 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 cannot be collected for 96 hours.
Clinical Reference
2. NIOSH Hexavalent Chromium Criteria Document Update, September 2008; Available from URL: http://www.cdc.gov/niosh/topics/hexchrom/

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
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