

## Overview

### Useful For

Detecting occupational exposure to cadmium, a toxic heavy metal in random urine specimens

### Profile Information

Test ID	Reporting Name	Available Separately	Always Performed
CDOU	Cadmium Occupational Exposure	No	Yes
CRETR	Creatinine, Random, U	No	Yes

### Special Instructions

- [Trace Metals Analysis Specimen Collection and Transport](#)

### Method Name

CDOU: Inductively Coupled Plasma-Mass Spectrometry (ICP-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 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.

**Supplies:** Urine Tubes, 10 mL (T068)

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

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

**Specimen Volume:** 3 mL

### Collection Instructions:

1. Collect urine a random urine specimen.



2. See [Trace Metals Analysis Specimen Collection and Transport](#) in Special Instructions for complete instructions.

**Specimen Minimum Volume**

1.5 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	
	Frozen	28 days	
	Ambient	14 days	

**Clinical and Interpretive****Clinical Information**

The toxicity of cadmium resembles the other heavy metals (arsenic, mercury, and lead) in that it attacks the kidney; renal dysfunction with proteinuria with slow onset (over a period of years) is the typical presentation. Measurable changes in proximal tubule function, such as decreased clearance of para-aminohippuric acid, also occur over a period of years and precede overt renal failure.

Breathing the fumes of cadmium vapors leads to nasal epithelial deterioration and pulmonary congestion resembling chronic emphysema.

For nonsmokers, the primary source of cadmium exposure is from the food supply. In general, leafy vegetables such as lettuce and spinach, potatoes and grains, peanuts, soybeans, and sunflower seeds contain high levels of cadmium. For smokers, the most common source of cadmium exposure is tobacco smoke, which has been implicated as the primary sources of the metal leading to reproductive toxicity in both males and females.

Chronic exposure to cadmium causes accumulated renal damage. The excretion of cadmium is proportional to creatinine except when renal damage has occurred. Renal damage due to cadmium exposure can be detected by increased cadmium excretion relative to creatinine.

The Occupational Safety and Health Administration (OSHA) mandated (Fed Reg 57:42,102-142,463, September 1992) that all monitoring of employees exposed to cadmium in the workplace should be done using the measurement of urine cadmium and creatinine, expressing the results of mcg of cadmium per gram of creatinine.

**Reference Values**

Biological Exposure Indices (BEI): <5.0 mcg/g creatinine

**Interpretation**

Urine cadmium levels primarily reflect total body burden of cadmium. Cadmium excretion above 3.0 mcg/g creatinine indicates significant exposure to cadmium.

For occupational testing, the Occupational Safety and Health Administration (OSHA) cadmium standard is below 3.0 mcg/g creatinine and the biological exposure index is 5 mcg/g creatinine.

## Cautions

Collection of urine specimens through a catheter frequently results in elevated values, because rubber contains trace amounts of cadmium that are extracted as urine passes through the catheter.

## Clinical Reference

1. deBurbure C, Buchet J-P, Leroyer A, et al: Renal and neurologic effects of cadmium, lead, mercury, and arsenic in children: Evidence of early effects and multiple interactions at environmental exposure levels. *Environ Health Perspect.* 2006;114:584-590
2. Schulz C, Angerer J, Ewers U, et al: Revised and new reference values for environmental pollutants in urine or blood of children in Germany derived from the German Environmental Survey on Children 2003-2006(GerESIV) *Int J Hyg Environ Health.* 2009;212:637-647
3. Occupational Safety and Health Administration:: Cadmium exposure and control. Updated 9/2/2008. Accessed July 17, 2020. US Department of Labor Available at [osha.gov/SLTC/cadmium/evaluation.html](https://www.osha.gov/SLTC/cadmium/evaluation.html)
4. Agency for Toxic Substances and Disease Registry: Toxicological profile for cadmium. US Department of Health and Human Services. September 2012. Available at [www.atsdr.cdc.gov/ToxProfiles/tp5.pdf](https://www.atsdr.cdc.gov/ToxProfiles/tp5.pdf)
5. Strathmann FG, Blum LM: Toxic elements. In: Rafai N, Horwath AR., Wittwer CT, eds. *Tietz Textbook of Clinical Chemistry and Molecular Diagnostics.* 6th ed. Elsevier; 2018:chap 42

## Performance

### Method Description

Cadmium (Cd) in urine is analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) in kinetic energy discrimination (KED) mode using gallium (Ga), rhodium (Rh), and iridium (Ir) as internal standards and a 5% nitric acid salt matrix calibration.(Unpublished Mayo method)

### PDF Report

No

### 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.

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**CPT Code Information**

82300

82570

**LOINC® Information**

Test ID	Test Order Name	Order LOINC Value
CDUOE	Cadmium Occupat Exp, Random, U	In Process

Result ID	Test Result Name	Result LOINC Value
CRETR	Creatinine, Random, U	2161-8
608892	Cadmium Occupational Exposure	13471-8