MAYO CLINIC LABORATORIES

Test Definition: CDCU

Cadmium/Creatinine Ratio, Urine

Overview

Useful For

Detecting exposure to cadmium using random urine specimens

Special Instructions

- Metals Analysis Specimen Collection and Transport

Method Name

Only orderable as part of profile. For more information, see:
-CDUCR / Cadmium/Creatinine Ratio, Random, Urine
-HMUCR / Heavy Metal/Creatinine Ratio, with Reflex, Random, Urine

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

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

Only orderable as part of profile. For more information, see:
-CDUCR / Cadmium/Creatinine Ratio, Random, Urine
-HMUCR / Heavy Metal/Creatinine Ratio, with Reflex, Random, Urine

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	
	Ambient	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

The toxicity of cadmium resembles the other heavy metals (arsenic, mercury, and lead) in that it attacks the kidney; kidney 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 kidney 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 source of the metal, leading to reproductive toxicity in both male and female patients.

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

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

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-HMUCR / Heavy Metal/Creatinine Ratio, with Reflex, Random, Urine

0-17 years: Not established
> or =18 years: <0.6 mcg/g Creatinine

Interpretation

Cadmium excretion above 3.0 mcg/g creatinine indicates significant exposure to cadmium.

Results above15 mcg/g creatinine are considered indicative of severe exposure.

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. de Burbure C, Buchet JP, 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(4):584-590

2. Schulz C, Angerer J, Ewers U, Heudorf U, Wilhelm M; Human Biomonitoring Commission of the German Federal Environment Agency. 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(6):637-647
3. Occupational Safety and Health Administration. Cadmium exposure and control. Updated 09/02/2008. Accessed August 30, 2024. US Department of Labor Available at 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
5. Strathmann FG, Blum LM. Toxic elements. In: Rifai N, Chiu RWK, Young I, Burnham CD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 44
6. Zhang H, Reynolds M. Cadmium exposure in living organisms: A short review. Sci Total Environ. 2019;678:761-767. doi:10.1016/j.scitotenv.2019.04.395

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
Monday through Friday

Report Available
2 to 4 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

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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

82300

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CDCU	Cadmium/Creatinine Ratio, U	13471-8

Result ID	Test Result Name	Result LOINC® Value
608902	Cadmium/Creatinine Ratio, U	13471-8