Test Definition: CUCRU

Copper/Creat Ratio, Random, U

Overview

Useful For

Investigation of Wilson disease and obstructive liver disease using a random urine specimen

Profile Information

Test ID	Reporting Name	Available Separately	Always Performed
CUCR	Copper/Creat Ratio, U	No	Yes
CDCR	Creatinine Concentration	No	Yes

Special Instructions

- Trace Metals Analysis Specimen Collection and Transport

Method Name

CUCR: Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

CDCR: Enzymatic Colorimetric Assay

NY State Available

Yes

Specimen

Specimen Type

Urine

Advisory Information

High concentrations of barium are known to interfere with most metal tests. If barium-containing contrast media has been administered, a specimen should not be collected for at least 96 hours.

Specimen Required

Supplies: Urine Tubes, 10 mL (T068)

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

Submission Container/Tube: Plastic, 10-mL urine tube or a 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 Trace Metals Analysis Specimen Collection and Transport in Special Instructions for complete instructions.

Forms

If not ordering electronically, complete, print, and send a Gastroenterology and Hepatology Client Test Request (T728) with the specimen.

Specimen Minimum Volume

0.7 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 and Interpretive

Clinical Information

The biliary system is the major pathway of copper excretion. Biliary excretion of copper requires an adenosine triphosphate (ATP)-dependent transporter protein. Variants in the gene for the transporter protein cause hepatolenticular degeneration (Wilson disease). Ceruloplasmin, the primary copper-carrying protein in the blood, is also reduced in Wilson disease. Urine copper excretion is increased in Wilson disease due to a decreased serum binding of copper to ceruloplasmin or due to allelic variances in cellular metal ion transporters.

Hypercupriuria (increased urinary copper) is also found in hemochromatosis, biliary cirrhosis, thyrotoxicosis, various infections, and a variety of other acute, chronic, and malignant diseases (including leukemia). Urine copper concentrations are also elevated in patients taking contraceptives or estrogens and during pregnancy.

Low urine copper levels are seen in malnutrition, hypoproteinemia, malabsorption, and nephrotic syndrome. Increased zinc consumption interferes with normal copper absorption from the gastrointestinal tract causing hypocupremia.

Reference Values

Males:

0-17 years: not established

> or =18 years: 9-43 mcg/g creatinine

Females:

0-17 years: not established

> or =18 years: 7-72 mcg/g creatinine

Interpretation

Humans normally excrete less than 60 mcg/24 hour in the urine.

Urinary copper excretion greater than 60 mcg/24 hour may be seen in:

-Wilson disease

-Obstructive biliary disease (eg, primary biliary cirrhosis, primary sclerosing cholangitis)

-Nephrotic syndrome (due to leakage through the kidney)

-Chelation therapy

-Estrogen therapy

-Mega dosing of zinc-containing vitamins

Because ceruloplasmin is an acute phase reactant, urine copper is elevated during acute inflammation. During the recovery phase, urine copper is usually below normal, reflecting the expected physiologic response to replace the copper that was depleted during inflammation.

Cautions

No significant cautionary statements

Clinical Reference

1. Zorbas YG, Kakuris KK, Deogenov VA, Yerullis KB: Copper homeostasis during hypokinesia in healthy subjects with higher and lower copper consumption. Tr Elem Electro. 2008;25:169-178

2. Lech T, Sadlik JK: Contribution to the data on copper concentration in blood and urine in patients with Wilson's disease and in normal subjects. Biol Trace Elem Res. 2007 Jul;118(1):16-20

3. Rifai N, Horwath AR, Wittwer CT, eds: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018

Performance

Method Description

This assay is performed on an inductively coupled plasma-mass spectrometer in dynamic reaction cell mode. Calibrating standards and blanks are diluted with an aqueous acidic diluent containing internal standards. Quality control specimens and patient samples are diluted in an identical manner. In turn, all diluted blanks, calibrating standards, quality control specimens and patient specimens are aspirated into a pneumatic nebulizer and the resulting aerosol directed to the hot plasma discharge by a flow of argon. In the annular plasma the aerosol is vaporized, atomized, and then ionized. The ionized gases plus neutral species formed in the annular plasma space are aspirated from the plasma through an orifice into a quadrupole mass spectrometer. The mass range from 1 to 263 amu is rapidly scanned multiple times and ion counts tabulated for each mass of interest. Instrument response is defined by the linear relationship of analyte concentration versus ion count ratio (analyte ion count/internal standard ion count). Analyte concentrations are derived by reading the ion count ratio for each mass of interest and determining the concentration from the response line.(Unpublished Mayo method)

Creatinine is measured using an enzymatic method 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.(Package insert: Creatinine plus ver 2. Roche Diagnostics; V15.0 03/2019)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday; Continuously

Analytic Time

1 day

Maximum Laboratory Time

4-6 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

82525-Copper Concentration

82570-Creatinine Concentration

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
CUCRU	Copper/Creat Ratio, Random, U	13829-7

Result ID	Test Result Name	Result LOINC Value
CDCR	Creatinine Concentration	2161-8
32872	Copper/Creat Ratio, U	13829-7