

Overview

Useful For

Investigation of Wilson disease and obstructive liver disease using a 24-hour urine specimen

Special Instructions

- [Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens](#)
- [Trace Metals Analysis Specimen Collection and Transport](#)

Method Name

Inductively Coupled Plasma-Mass Spectrometry

NY State Available

Yes

Specimen

Specimen Type

Urine

Necessary Information

24-Hour volume is required.

Specimen Required

Patient Preparation: High concentrations of barium are known to interfere with this test. If barium-containing contrast media has been administered, a specimen should not be collected for at least 96 hours.

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 urine tube 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: See [Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens](#) in Special Instructions for multiple collections.

Forms

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

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

Specimen Minimum Volume

0.4 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 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.

Hypercupricuria (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, hypoproteinemias, malabsorption, and nephrotic syndrome. Increased zinc consumption interferes with normal copper absorption from the gastrointestinal tract causing hypocupremia.

Reference Values

0-17 years: not established

> or =18 years: 9-71 mcg/24 hours

Interpretation

Humans normally excrete less than 60 mcg/day of copper in the urine.

Urinary copper excretion greater than 60 mcg/day 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, et al: 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 July;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. Calibration standards and blanks are diluted with an aqueous acidic diluent containing internal standards. Quality control specimens and patient specimens 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)

PDF Report

No

Day(s) Performed

Monday, Thursday

Report Available

2 to 5 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

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 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 US Food and Drug Administration.

CPT Code Information

82525

LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---------|------------------|--------------------|
| CUU | Copper, 24 Hr, U | 5633-3 |

| Result ID | Test Result Name | Result LOINC® Value |
|-----------|---------------------|---------------------|
| 8590 | Copper, 24 Hr, U | 5633-3 |
| TM7 | Collection Duration | 13362-9 |
| VL4 | Urine Volume | 3167-4 |