

**Overview****Useful For**

Assessing the cause of abnormal serum magnesium concentrations

Determining whether nutritional magnesium loads are adequate

Calculating urinary calcium oxalate and calcium phosphate supersaturation and assessing kidney stone risk.

**Method Name**

Colorimetric Endpoint Assay

**NY State Available**

Yes

**Specimen****Specimen Type**

Urine

**Specimen Required**

**Collection Container/Tube:** Plastic urine container

**Submission Container/Tube:** Plastic, 5-mL tube (T465) or a clean, plastic aliquot container with no metal cap or glued insert

**Specimen Volume:** 4 mL

**Collection Instructions:**

1. Collect a random urine specimen.
2. No preservative.

**Forms**

If not ordering electronically, complete, print, and send a [Renal Diagnostics Test Request](#) (T830) with the specimen.

**Specimen Minimum Volume**

1 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)	14 days	

Specimen Type	Temperature	Time	Special Container
	Frozen	14 days	
	Ambient	72 hours	

## Clinical and Interpretive

### Clinical Information

Magnesium, along with potassium, is a major intracellular cation. Magnesium is a cofactor of many enzyme systems. All adenosine triphosphate-dependent enzymatic reactions require magnesium as a cofactor. Approximately 70% of magnesium ions are stored in bone. The remainder is involved in intermediary metabolic processes; about 70% is present in free form, while the other 30% is bound to proteins (especially albumin), citrates, phosphate, and other complex formers. The serum magnesium level is kept constant within very narrow limits.

Renal handling of magnesium is determined by the combination of filtration and reabsorption. Roughly 70% of the magnesium in plasma is filtered by the glomeruli; 20% to 30% of the filtered magnesium is reabsorbed in the proximal tubule, while less than 5% is reabsorbed in the distal tubule and collecting duct.(1)

Numerous causes of renal magnesium wasting have been identified including (but not limited to) congenital defects (including Barter and Gitelman syndrome), various endocrine disorders (including hyperaldosteronism and hyperparathyroidism), exposure to certain drugs (ie, diuretics, *cis*-platinum, aminoglycoside antibiotics, calcineurin inhibitors), and other miscellaneous causes (including chronic alcohol abuse). Gastrointestinal conditions associated with fat malabsorption and chronic diarrhea can cause fecal magnesium loss and hypomagnesemia.

High levels of plasma magnesium are typically only seen in patients with decreased renal function, after administration of a magnesium load large enough to exceed the kidneys' ability to excrete it, or a combination of the two.(2)

Magnesium is an inhibitor of calcium crystal growth, and contributes to urinary calcium oxalate and calcium phosphate supersaturation. However, low urinary magnesium in isolation has not been identified as a common cause of kidney stones, nor has magnesium supplementation been proven as an effective therapy for stone prevention.

### Reference Values

Random Magnesium/Creatinine Ratio: > or =0.035 mg/mg

Reference values have not been established for patients <18 years and >83 years of age.

### Interpretation

Urinary magnesium excretion should be interpreted in concert with serum concentrations.

In the presence of hypomagnesemia, a 24-hour urine magnesium >24 mg/day or fractional excretion >0.5% suggests renal magnesium wasting. Lower values suggest inadequate magnesium intake and/or gastrointestinal losses.

In the presence of hypermagnesemia, urinary magnesium levels provide an indication of current magnesium intake.

Lower urinary magnesium excretion increases urinary calcium oxalate and calcium phosphate supersaturation and could contribute to kidney stone risk.

### Cautions

Urinary magnesium excretion must be interpreted with caution during periods of intravenous magnesium infusion.

### Clinical Reference

1. Al Ghamdi SM: Magnesium deficiency: pathophysiologic and clinical overview. Am J Kidney Dis 1994;24(5):737-752

2. Sutton RA: Abnormal renal magnesium handling. Miner Electrolyte Metab 1993;19(4-5):232-240

### Performance

#### Method Description

In alkaline solution, magnesium forms a purple complex with xylydyl blue, diazonium salt. The magnesium concentration is measured photometrically via the decrease in xylydyl blue absorbance. (Package insert: Roche MG2 kit, Indianapolis, IN, V2 2012)

#### PDF Report

No

#### Day(s) and Time(s) Test Performed

Monday through Sunday; Continuously.

#### Analytic Time

Same day/1 day

#### Maximum Laboratory Time

3 days

#### Specimen Retention Time

7 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 has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements.

#### CPT Code Information

83735

#### LOINC® Information



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Test ID	Test Order Name	Order LOINC Value
MAGNR	Magnesium, Random, U	19124-7

Result ID	Test Result Name	Result LOINC Value
MGCO	Magnesium, Random, U	19124-7
CREA7	Creatinine Concentration	2161-8
MCTR	Magnesium/Creatinine Ratio	13474-2