

## Overview

### Useful For

Diagnosis and monitoring of a wide range of disorders including diseases of bone, kidney, parathyroid gland, or gastrointestinal tract

### Method Name

Photometric

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Necessary Information

Patient's age is required.

### Specimen Required

#### Collection Container/Tube:

**Preferred:** Serum gel

**Acceptable:** Red top

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 0.5 mL

#### Collection Instructions:

1. If drawing for more than total calcium, send first tube drawn.
2. Serum gel tubes should be centrifuged within 2 hours of collection.
3. Red-top tubes should be centrifuged and the serum aliquoted into a plastic vial within 2 hours of collection.

### Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:

-[Kidney Transplant Test Request](#)

-[Renal Diagnostics Test Request \(T830\)](#)

### Specimen Minimum Volume

0.25 mL

### Reject Due To

Gross	Reject
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hemolysis	
Gross lipemia	OK

### Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	240 days	
	Refrigerated	21 days	

### Clinical & Interpretive

#### Clinical Information

The calcium content of an adult is somewhat over 1 kg (about 2% of the body weight). Of this, 99% is present as calcium hydroxyapatite in bones and less than 1% is present in the extra-osseous intracellular space or extracellular space (ECS). The calcium level in the ECS is in dynamic equilibrium with the rapidly exchangeable fraction of bone calcium. In serum, calcium is bound to a considerable extent to proteins (approximately 40%), 10% is in the form of inorganic complexes, and 50% is present as free or ionized calcium.

Calcium ions affect the contractility of the heart and the skeletal musculature, and are essential for the function of the nervous system. In addition, calcium ions play an important role in blood clotting and bone mineralization.

Hypocalcemia is due to the absence or impaired function of the parathyroid glands or impaired vitamin-D synthesis. Chronic renal failure is also frequently associated with hypocalcemia due to decreased vitamin-D synthesis as well as hyperphosphatemia and skeletal resistance to the action of parathyroid hormone (PTH). Characteristic symptoms of hypocalcemia are latent or manifest tetany and osteomalacia.

Hypercalcemia is brought about by increased mobilization of calcium from the skeletal system or increased intestinal absorption. A majority of cases are due to primary hyperparathyroidism (pHPT) or bone metastasis of carcinoma of the breast, prostate, thyroid gland, or lung. Patients who have pHPT and bone disease, renal stones or nephrocalcinosis, or other signs or symptoms are candidates for surgical removal of the parathyroid glands. Severe hypercalcemia may result in cardiac arrhythmia.

Calcium levels may also reflect abnormal vitamin D or protein levels.

#### Reference Values

<1 year: 8.7-11.0 mg/dL

1-17 years: 9.3-10.6 mg/dL

18-59 years: 8.6-10.0 mg/dL

> or =60 years: 8.8-10.2 mg/dL

#### Interpretation

##### Hypocalcemia:

Long-term therapy must be tailored to the specific disease causing the hypocalcemia. The therapeutic endpoint is to achieve a serum calcium level of 8.0 to 8.5 mg/dL to prevent tetany. For symptomatic hypocalcemia, calcium may be

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administered intravenously.

**Hypercalcemia:**

The level at which hypercalcemic symptoms occur varies from patient to patient. Symptoms are common when serum calcium levels are above 11.5 mg/dL, although patients may be asymptomatic at this level. Levels above 12.0 mg/dL are considered a critical value. Severe hypercalcemia (>15.0 mg/dL) is a medical emergency.

**Cautions**

The interference of intravenously administered gadolinium containing MRI (magnetic resonance imaging) contrast media was tested (Omniscan, Optimark) but no interference was found at the therapeutic concentration. Interferences at higher concentrations were observed.

**Clinical Reference**

1. Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018.
2. Baldwin TE, Chernow B: Hypocalcemia in the ICU. *J Crit Illness*. 1987;2:9-16
3. Estey MP, Cohen AH, Colantonio DA, et al: CLSI-based transference of the CALIPER database of pediatric reference intervals from Abbott to Beckman, Ortho, Roche and Siemens Clinical Chemistry Assays: direct validation using reference samples from the CALIPER cohort. *Clin Biochem*. 2013;46:1197-1219

**Performance****Method Description**

Calcium ions react with 5-nitro-5'-methyl-1,2-bis(o-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid (NM-BAPTA) under alkaline conditions to form a complex. This complex reacts in the second step with EDTA. The change in absorbance is directly proportional to the calcium concentration and is measured photometrically.(Package insert: Roche Calcium Gen.2 reagent. Roche Diagnostics; 07/2012)

**PDF Report**

No

**Day(s) Performed**

Monday through Sunday

**Report Available**

Same day/1 to 2 days

**Specimen Retention Time**

1 week

**Performing Laboratory Location**

Mayo Clinic Laboratories - Rochester Main Campus

## 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

This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

### CPT Code Information

82310

### LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CA	Calcium, Total, S	17861-6

Result ID	Test Result Name	Result LOINC® Value
CA	Calcium, Total, S	17861-6