



[CLINICIAN LOGIN \(HTTPS://GPLCLINICIANPORTAL.COM/\)](https://GPLCLINICIANPORTAL.COM/)  
[PAYMENTS \(/PAYMENTS\)](#)  
[CLINICIANS](#)  
[RESULTS ONLINE/CLINICIAN LOGIN \(/RESULTS\)](#)  
[ORDER A TEST \(/SETUP-AN-ACCOUNT\)](#)  
[SET UP OR UPDATE AN ACCOUNT \(/SETUP-AN-ACCOUNT\)](#)  
[SEARCH TESTS \(/SELECT-A-TEST\)](#)  
[AUTHORIZE A TEST FOR A PATIENT](#)  
 [\(HTTPS://WWW.GREATPLAINSLABORATORY.COM/PHYSICIAN-ORDER-LP\)](https://WWW.GREATPLAINSLABORATORY.COM/PHYSICIAN-ORDER-LP)  
[PRICING + PAYMENTS + INSURANCE \(/CLINICIAN-PRICING-PAYMENT-INSURANCE\)](#)  
[COLLECTION INSTRUCTIONS \(/INSTRUCTIONS-LANGUAGE\)](#)  
[FORMS \(/NEW-PAGE-3\)](#)  
[PATIENTS](#)  
[SARS-COV-2 ANTIBODY TEST \(/CONSUMER-SARSCOV2-ANTIBODY-TEST\)](#)  
[SEARCH TESTS \(/SELECT-A-TEST\)](#)  
[ORDERING OPTIONS \(/ORDER-A-TEST-PATIENT\)](#)  
[COLLECTION INSTRUCTIONS \(/INSTRUCTIONS-LANGUAGE\)](#)  
[HEALTH CONDITIONS + RECOMMENDED TESTING \(/WHAT-TEST-IS-FOR-ME\)](#)  
[RESULTS \(/PATIENT-RESULTS\)](#)  
[FORMS \(/NEW-PAGE-3\)](#)  
[PRICING + PAYMENTS + INSURANCE \(/SHIPPING-BILLING-PAYMENTS\)](#)  
[SELECT A TEST](#)  
[ORGANIC ACIDS TEST \(/ORGANIC-ACIDS-TEST\)](#)  
[MYCOTOX PROFILE \(MOLD EXPOSURE\) \(/GPLMYCOTOX\)](#)  
[GPL-TOX PROFILE \(TOXIC NON-METAL CHEMICALS\) \(/GPL-TOX\)](#)  
[SARS-COV-2 ANTIBODY TEST \(/SARS-COV-2-ANTIBODY-TEST\)](#)  
[GLYPHOSATE TEST \(/GLYPHOSATE-TEST\)](#)  
[IGG FOOD MAP WITH CANDIDA + YEAST \(/FOOD-MAP-IGG-SENSITIVITY-PROFILE\)](#)  
[VIEW ALL \(/SELECT-A-TEST\)](#)  
[ABOUT](#)  
[COMPANY \(/OUR-COMPANY\)](#)  
[STAFF \(/OUR-TEAM\)](#)  
[TESTIMONIALS \(/TESTIMONIALS\)](#)  
[QUALITY SERVICE \(/QUALITY-SERVICE\)](#)  
[CAREERS \(/CAREERS-1\)](#)  
[PRIVACY POLICY \(/PRIVACY-POLICY\)](#)  
[CANCELLATION POLICY \(/CANCELLATION-POLICY\)](#)  
[RESOURCES](#)  
[WEBINAR LIBRARY \(/WEBINAR-LIBRARY\)](#)  
[ARTICLES \(/ARTICLES\)](#)  
[GPL BLOG \(/GPL-BLOG\)](#)  
[BOOKSTORE \(HTTP://HEALTHLINKPARTNERS.COM/GPLBOOKS/INDEX.PHP\)](http://HEALTHLINKPARTNERS.COM/GPLBOOKS/INDEX.PHP)  
[EVENTS \(/EVENTS-1\)](#)  
[GPL ACADEMY \(HTTP://WWW.GPLWORKSHOPS.COM\)](http://WWW.GPLWORKSHOPS.COM)  
[NUTRITIONAL SUPPLEMENTS \(HTTP://WWW.NBNUS.NET/\)](http://WWW.NBNUS.NET/)  
[FAQ \(/FAQ-1\)](#)  
[BLOOD DRAW SERVICES \(/BLOOD-DRAW-SERVICES\)](#)  
[COLLECTION INSTRUCTIONS \(/INSTRUCTIONS-LANGUAGE\)](#)  
[CLINICAL REFERENCES \(/CLINICAL-REFERENCES\)](#)  
[CONTACT \(/CONTACT\)](#)

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# Urine Calcium And Magnesium In Adults: Recommended Test For Nutritional Adequacy (/Articles-1/2016/2/22/Urine-Calcium-And-Magnesium-In-Adults-Recommended-Test-For-Nutritional-Adequacy)

February 22, 2016 (/articles-1/2016/2/22/urine-calcium-and-magnesium-in-adults-recommended-test-for-nutritional-adequacy) · Vit D Resources (/articles-1/category/Vit+D+Resources), Cal + Mag Resources (/articles-1/category/Cal+%2B+Mag+Resources)

WILLIAM SHAW, PHD

## Calcium

Calcium is one of the most tightly regulated substances in the body. In addition to the role of calcium as a structural element in bones and teeth (99% of the body's calcium is in the bones), calcium is critically needed for nerve function. When calcium in the plasma drops about 30%, the person may develop tetany, a condition that is often fatal due to overstimulation of the nerves in both the central nervous system and peripheral nervous system, leading to tetanic contraction of the skeletal muscles. The concentration of calcium in the plasma is one of the most constant laboratory values ever measured. In the great majority of normal people, calcium only varies from 9-11 mg per dL, regardless of the diet (1). The reason is a complex hormonal system that utilizes the bones as a source of calcium. This regulatory system employs the parathyroid gland that secretes parathyroid hormone or parathormone to digest the bones and release calcium when there is only a small decrease in the plasma calcium. Parathormone also increases the absorption of calcium from the gastrointestinal tract and the kidney tubules. When calcium rises in the plasma, parathormone secretion decreases, depositing more calcium in the bones while renal and gastrointestinal absorption are decreased. Calcitonin, a polypeptide hormone produced by the thyroid gland, opposes the effects of parathormone. In addition, vitamin D increases the absorption of calcium

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from the gastrointestinal tracts and the kidney tubules like parathyroid hormone but has little effect on digesting bones to release calcium. One of the most controversial and misunderstood topics is what is the optimum nutritional intake of calcium and vitamin D. In the center of the controversy is the role of calcium in the initiation of plaque in the arteries, leading to atherosclerosis and cardiovascular disease.

An average adult ingests about 750 mg per day of calcium and secretes about 625 mg of calcium in the intestinal juices. If all the ingested calcium is absorbed, there would be a net absorption of 125 mg per day of calcium. Since the average person excretes about 125 mg calcium per day in the urine, the average person has a zero net calcium balance except when bone is being deposited. If bone is being deposited due to the stress of exercise or following a fracture, the regulation of the amount of urinary calcium excretion is the major factor to allow for bone growth. One of the major factors that prevents calcium absorption is the presence of high amounts of oxalates in the diet. The human body has the ability to make some oxalate endogenously, perhaps about 40 mg per day in individuals with a favorable genetic makeup. A low oxalate diet contains less than 50 mg per day of oxalates while a high oxalate diet with two cups or more of spinach, nuts, and berries in a smoothie or salad per day could easily contain 1500 mg per day of oxalates. Such high amounts of oxalates readily use up the 125 mg of available calcium, forming insoluble calcium oxalate salts which can deposit in every organ of the body. These deposits can easily initiate endothelial damage that can lead to strokes and myocardial infarctions (heart attacks) and such oxalate deposits have been detected in atherosclerotic lesions. The person on a high oxalate diet will have a much greater need for calcium and/or magnesium than the person on a low oxalate diet.

Since urine is the major controlling element for maintaining calcium balance that is under tight hormonal control, it appears to me that urine calcium is the best indicator of adequate dietary calcium. The most common reasons for low urine calcium are inadequate dietary calcium and/or a high oxalate diet. Other reasons for calcium deficiency include hypoparathyroidism, pseudohypoparathyroidism, vitamin D deficiency, nephrosis, nephritis, bone cancer, hypothyroidism, celiac disease, and malabsorption disorders.

The most common reason for high urine calcium is a diet high in calcium. Other reasons for calcium excess are vitamin D intoxication, hyperparathyroidism, osteolytic bone metastases, myeloma, excessive immobilization, Cushing's syndrome, acromegaly, distal renal tubular acidosis, thyrotoxicosis, Paget's disease, Fanconi's syndrome, schistosomiasis, breast and bladder cancers, and sarcoidosis.

## Magnesium



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essential element like calcium and is also in the bones (66% of the m is in the bones). It is a cofactor with many enzymatic reactions

especially those requiring vitamin B6. Like extremely low calcium, extremely low magnesium can also cause tetany of the muscles.

### Low magnesium

The most common reason for low urine magnesium is low magnesium in the diet. Low magnesium in the diet may increase the incidence of oxalate crystal formation in the tissues and kidney stones. Less common causes of low magnesium include celiac disease, other malabsorption disorders, dysbiosis, vitamin D deficiency, pancreatic insufficiency, and hypothyroidism. Early signs of magnesium deficiency include loss of appetite, nausea, vomiting, migraine headaches, fatigue, and weakness. As magnesium deficiency worsens, numbness, tingling, muscle contractions and cramps, seizures, personality changes, anxiety, depression, attention deficit, abnormal heart rhythms, and coronary spasms can occur. Low urinary magnesium for long time periods is associated with increased risk of ischemic heart disease.

### High magnesium

The most common reason for high urine magnesium is high magnesium in the diet. Less common causes of high urine magnesium include alcoholism, diuretic use, primary aldosteronism, hyperthyroidism, vitamin D excess, gentamicin toxicity, and cis-platinum toxicity. Increased urinary magnesium excretion can occur in people with insulin resistance and/or type 2 diabetes. Symptoms of marked magnesium excess can include diarrhea, hypotension, nausea, vomiting, facial flushing, retention of urine, ileus, depression, lethargy before progressing to muscle weakness, difficulty breathing, extreme hypotension, irregular heartbeat, and cardiac arrest.

### REFERENECS

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