The Great Plains Laboratory, Inc.

New Test: Calcium + Magnesium Profile
Why Urine Testing is More Useful than Blood Testing

Overview
The Great Plains Laboratory, Inc. announces its new urine test for calcium and magnesium, which can easily be added on to our Organic Acids Test, GPL-TOX Profile, and Microbial Organic Acids Test at a discounted price. 10 mL of first morning urine is required. Read below to find out why urine testing for calcium and magnesium is more clinically useful than blood testing.

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. 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. Since urine is the major controlling element for maintaining calcium balance that is under tight hormonal control, it appears 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.

Magnesium
Magnesium is an essential element like calcium and is also in the bones (66% of the body's magnesium 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 in the diet may also increase the incidence of oxalate crystal formation in the tissues and kidney stones. Early signs of magnesium deficiency include loss of appetite, nausea, vomiting, migraine headaches, fatigue, and weakness.

The most common reason for high urine magnesium is high magnesium in the diet. Less common causes of high urine magnesium include insulin resistance, alcoholism, diuretic use, primary aldosteronism, hyperthyroidism, vitamin D excess, gentamicin toxicity, and cis-platinum toxicity. Symptoms of marked magnesium excess can include diarrhea, hypotension, nausea, vomiting, facial flushing, retention of urine, ileus, depression, and lethargy.

Metabolic Markers in Urine		Reference Range (mmol/mol creatinine)			Patient Value	Reference Population - Males Age 13 and Over
Mineral Metabolism						
1	Calcium	10	- 220	L	5.0	
2	Magnesium	30	- 100	L	6.3	

Rickets and Dangerous Eye-Poking Behavior in Autism Associated with Calcium Deficiency

William Shaw, PhD

Failure to provide adequate calcium to persons on the autistic spectrum is very dangerous and could lead to the loss of the eyes due to severe eye-poking behavior. This is an especially important topic because some individuals like Amy Yasko warn that calcium may cause overstimulation of neurons. Every element in our food and drink including water may cause death with excess intake but you will not find skull and cross-bone warnings on bottled water at the supermarket. The most relevant question is: How much calcium in the diet and in supplements is excessive?

Calcium deficiency can be a severe problem in normal children on a milk-free and dairy-free diet since milk is a significant source of protein, vitamin D, and calcium needed for strong bones and teeth. Some physicians have reported that rickets, a severe bone deformity, occurred in children with autism on the gluten and casein-free diet who did not receive added calcium supplements. Calcium and vitamin D supplementation is essential to children on a casein-free diet since most children with autism do not eat substantial amounts of other calcium-rich foods. Failure to provide adequate calcium to children on casein-free diets leads physicians to view such parents as negligent and ignorant and leads to skepticism about other nonstandard treatments for autism.

Children with autism may have an even more severe problem with calcium deficiency. Mary Coleman, M.D. reported that children with autism who are calcium deficient are much more likely to poke out their eyes and a substantial number of children with autism have done so. I have talked to numerous parents of children with autism that began to touch their eyes after starting the casein-free diet. This abnormal behavior is associated with low urine calcium; blood calcium levels were usually normal. Parathyroid hormone, calcitonin, and vitamin D were all normal in patients with autism but all of them had low urine calcium. Treatment with calcium supplementation prevents this behavior but dietary supplementation with high calcium foods does not. (I suspect that this behavior is due to increased eye pain due to high deposits of oxalate crystals in the eye. Oxalates are high in urine samples of children with autism and can deposit in many tissues including the eyes. Low calcium may act to intensify this pain and poking out the eye relieves the pain.) Dr. Coleman also found that speech developed very quickly after calcium supplementation in a portion of mute children with autism who had low urine calcium. In one case, according to a parent who contacted me, her child with autism persisted in poking at the eyes even after one eye had been partially poked out and surgically re-implanted. Calcium supplementation stopped this behavior immediately. I am aware of many other children with eye-poking behavior in which calcium supplements stopped this behavior in less than two days. Verbal autistic children say that their eye pain is severe and that calcium supplementation stopped their pain quickly. In Coleman's study of 78 children with autism, 20% had urine calcium values two standard deviations below the normal child's range for urine calcium. Clearly, this extremely low group requires supplementation with calcium. I would recommend calcium supplementation for any child below the mean value urine calcium for normal children of the same age.

Magnesium research in autism is often combined with research on vitamin B6 since the two nutritional factors work together in a host of biochemical reactions. In one study in France, children on the autistic spectrum were given 6 mg per kilogram of body weight per day of magnesium and 0.6 mg per kilogram body weight of vitamin B6. This supplementation improved autistic symptoms including the following: social interactions (23/33), communication (24/33), stereotyped restricted behavior (18/33), and abnormal/delayed functioning (17/33). When the Mg-B6 treatment was stopped, autistic symptoms reappeared in a few weeks. Low magnesium levels may be associated with restlessness, sensitivity to noise, poor attention span, poor concentration, irritability, aggressiveness, and anxiety.

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