

## Magnesium Taurate

Robert Pastore, Ph.D.

### Biochemistry

Magnesium plays a role in 300 enzyme reactions in the human body and is the most abundant divalent mineral cation in cells, second only in electrolyte quantity to potassium. Some examples of important enzyme reactions include hexokinase, which phosphorylates glucose by way of MgATP and other enzymes necessary for the glycolytic cycle. Magnesium is required for steps in the tricarboxylic acid cycle, and for 3 of the 4 steps in gluconeogenesis. It plays a role in fatty acid synthesis, amino acid activation via RNA and DNA polymerases, carboxylation reactions, and transketolase reaction involving thiamine. Magnesium plays a role in the formation of cyclic adenosine monophosphate (cAMP), which plays a role in asthma and the secretion of parathyroid hormone.

### Antioxidant

Did you know the endogenous production of glutathione is dependant on magnesium? Low magnesium can induce a secondary glutathione deficiency. Many practitioners employ intravenous glutathione and oral absorbable forms of glutathione to increase antioxidant power in the body. However, a primary concern for these practitioners should be to increase magnesium in a highly absorbable form.

### Energy Production

We are all familiar with the cellular energy currency of the body, adenosine triphosphosphate (ATP). However, did you know that it exists in cells primarily as magnesium ATP (MgATP).

Ribose supplementation has become very popular for treating fatigue, fibromyalgia, heart disease and many other conditions. The negatively charged ribose has an affinity for magnesium.

Intestinal absorption studies indicate that the larger the supplemented dose, the lower the rate of absorption. It's better to take a smaller supplemented dose of magnesium several times per day as opposed to one or two large doses.

### Clinical Overview

Magnesium deficiency is associated with elevated triglycerides, initial elevations in PTH followed by low levels, refractory vitamin D deficiency as measured by 25 hydroxy-vitamin D blood test. Magnesium deficits elevate

plasma concentrations of inflammatory cytokines such as IL-1, IL-6 and TNF alpha, which is associated with many disease states, including cancer and diabetes. An increase in histamine is to be expected, and all histamine sensitive conditions, from allergies, fatigue and irritable bowel deficiency will flare in the presence of a magnesium deficiency.

### *Taurine the Carrier*

Taurine is the endproduct of cysteine catabolism. Taurine, 2-aminoethane sulfonate is formed from cysteine by removal of the carboxyl group and the oxidation of the sulfur to form a sulfonic acid group. Taurine is virtually void in strict vegetarianism.

Those who attend my neurobiology lectures know that I consider cysteine a conditionally essential amino acid, utilized in large quantities to assist detoxification pathways and support tissue growth and repair. From a neurobiological perspective, cysteine is responsible for starting and ending the catecholamine cycle. It begins the cycle as the core sulfur amino acid that drives heme thiolate - the ignition for tyrosine hydroxylase, the enzyme required for dopa production, and it ends the cycle by playing a major role in phenylethanolamine-N-methyl transferase conversion of norepinephrine into epinephrine.

Having said that, we can understand how cysteine can quickly deplete. Taurine synthesis requires both cysteine dioxygenase and cysteine sulfinate decarboxylase. S-Carboxymethyl-L-cysteine has been used as a marker substrate for cysteine metabolism, by cysteine dioxygenase. About 20% of healthy individuals are poor s-oxydizers, based upon conversion of SCMC to urinary metabolites, SCMC sulfoxide or methylcysteine sulfoxide. A low capacity to oxidize SCMC has been observed in individuals with liver diseases and rheumatoid arthritis.

In clinical studies, taurine lowers elevated blood pressure, retards cholesterol-induced atherogenesis, prevents arrhythmias and stabilizes platelets--effects parallel to those of magnesium. The complex magnesium taurate may thus have considerable potential as a vascular-protective nutritional supplement. The effects of magnesium taurate in diabetes deserve particular attention, since both magnesium and taurine may improve insulin sensitivity, and also may lessen risk for the micro- and macrovascular complications of diabetes.

Because of its ability to travel intracellularly, and the similar characteristics it shares with the amino acid taurine, this reveals why magnesium taurate is the preferred form of supplemental magnesium, and a marriage made in heaven.

## Clinical Use and Hypothesis in Medical Literature

Research papers have been written about the ability of magnesium taurate to reduce the incidence of preeclampsia, and along with fish oil to reduce the incidence of migraine headaches.

Clinical studies have found magnesium to play a major role in Insulin Action, Diabetes, and Cardio-Metabolic processes (Mol Aspects Med. 2003 Feb-Jun; 24 (1-3):39-52), and for hypertension (Hypertension, Vol 13, 227-232). The quantity of clinical studies in peer-reviewed journals is astounding. Type "magnesium" into medline search engine (an internet program that locates medical studies for health care professionals) and you will receive no less than 8000 hits!

By now, I'm sure you are aware why magnesium is an essential nutrient for health. Doctors categorize specific conditions that may benefit from magnesium in the following groups.

### Cardiovascular/Endocrine\*

Heart attack  
High blood pressure  
Diabetes  
Stroke

### Women's Health\*

PMS  
Pre-eclampsia  
Pre-term labor  
Osteoporosis

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### Pain Management/Energy/Respiratory\*

Leg cramps  
Migraines  
Fatigue  
Asthma

### References

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