

Magnesium: Cornerstone of Nutritional Health Insurance

By Parris Kidd, Natural Products Insider



Humans require magnesium to live, and research has shown its specific benefits to sports nutrition, heart health and cognitive function.

Magnesium is a mineral nutrient integral to human survival.¹ It is vital for virtually all the body's life processes,^{2,3,4} yet magnesium deficiency is widespread in the United States.⁵ Some 300 of the human enzymes that generate "energy currency"—adenosine triphosphate (ATP)—require this mineral, as do hundreds of the other enzymes, transporter proteins, receptors, and signaling molecules that power our trillions of cells.^{2,3,4,6}

In our cells, magnesium is essential to make DNA, package it into genes and chromosomes, add telomeres (linked to health and longevity⁷), and translate the coded DNA into new protein molecules as needed.^{1,2,3} Magnesium also counters damaging calcium buildup in soft tissues.³ It is also linked to vitamin D utilization—magnesium deficiency likely worsens vitamin D deficiency.⁸

Magnesium is fundamental to physical performance,^{9,10} and it is indispensable for both heart muscle contraction-relaxation and for regulating the heartbeat. The skeletal muscles that control voluntary movements also need it. Taking effective magnesium supplements with workouts helps replace losses from the muscle exercise and sweating. Magnesium supplements are

increasingly being used to relax muscle cramping, including for migraine prevention,⁴ as well as to calm the mind and improve quality of sleep.¹¹

Magnesium is also a cornerstone of circulatory health.¹²⁻¹⁶ A recently published, 24-year-long study found that low serum magnesium predicted higher risk for peripheral arterial disease, which reflects atherosclerosis outside of the coronary arteries.¹² Previously it's been established that magnesium is needed for maintaining muscle tone in the large and small blood vessels, which closely relates to blood pressure control.^{2,3,13} And sufficiency of magnesium for the heart and circulation helps ensure blood flow to the brain.

The human brain has an enormous energy appetite: it needs at least 20 percent of all the body's energy.¹⁷ Making all this energy requires magnesium, and the brain's trillions of nerve cell connections (synapses) need this mineral to facilitate information processing networks.^{1,18} And magnesium is also needed to keep the blood-brain barrier tight and help prevent unwanted agents from entering the brain.¹⁹

Brain research with magnesium has accelerated in recent years. Good magnesium status is now proven essential to memory, learning, concentration, mood, behavior and even personality.^{1,18,20,21} Magnesium helps control anxiety, especially when under stress.²⁰ Magnesium also facilitates our brain's "plasticity," its capacity to adapt to functional challenges.¹⁸ Supplementing with magnesium can improve memory and other cognitive function.²¹

So much clinical research data is now available on magnesium's health benefits that "meta-analyses" are being published. When well designed, such analyses increase the statistical power to detect benefit (or lack thereof) by pooling the data from multiple clinical trials.

Currently meta-analyses link higher blood magnesium levels to lowered risk for hypertension, coronary heart disease and type 2 diabetes,²² also to healthy levels of CRP (C-reactive protein), a marker of inflammation.²³ One meta-analysis of data from more than 1 million individuals linked higher magnesium intake to reduced risk of stroke, heart failure, diabetes and all-cause mortality.²⁴ Meta-analysis is revealing genes that link magnesium deficiency to insulin resistance.²⁵

Bone supplements should always include magnesium, as calcium's incorporation into bone must be preceded by magnesium incorporation. Most of the body's magnesium is present in the bones, and magnesium plays several roles in facilitating bone cell proliferation and calcium crystal formation.² Higher magnesium intake is linked to lower risk of bone fracture.²⁶

Pregnant and breastfeeding women are another emerging demographic in need of magnesium supplementation. Not surprisingly, magnesium is fundamental both to the baby's development and the mother's health during pregnancy.⁴ Plus, children on the autistic spectrum can benefit from supplements that combine magnesium with vitamin B6.²⁷

Insufficient dietary intake of magnesium is widespread. Comprehensive surveys by the U.S. Centers for Disease Control and Prevention (CDC) have indicated that a majority of Americans

aren't reaching the Recommended Dietary Allowance (RDA) of this vital nutrient.^{4,6} Whole, unprocessed leafy-green vegetables, grains, nuts, beans and bananas can be good plant food sources,⁴ but poor soils, poor farming methods and industrial processing deplete the content.^{3,4} With the continuing decline of magnesium content of vegetables and other foods in recent decades,²⁸ supplementing with magnesium is a worthwhile option.

The true incidence of magnesium deficiency is masked by inadequate lab test methods.²⁸ Though 99 percent of the body's magnesium is located inside our cells, the standard lab test measures only blood (serum) magnesium, located outside our cells. Factors such as stress, high alcohol intake, use of various over-the-counter (OTC) or prescription drugs, diabetes, prolonged exercise, digestive or kidney problems, and advancing age, all contribute to magnesium deficiency.^{3,4}

Most existing magnesium supplements are substandard. Magnesium can only get into our cells in its ionized form—the magnesium atom with two positive charges (Mg^{2+}).^{1,2,3,28} To generate magnesium ions, the magnesium compound must dissolve in water. Magnesium oxide fails to dissolve in water and, in absorption studies, fails to deliver magnesium ions into the blood,²⁹ yet it continues to be widely used as a magnesium supplement ingredient. Compared to the oxide form, magnesium citrate, glycinate, malate and threonate dissolve into water far better, and all feature good to excellent absorption, tolerability, and health benefits.^{21,29-31}

After decades of being underrecognized, magnesium is now in the spotlight. Hundreds of millions of people likely can benefit from taking competently formulated magnesium supplements. This makes magnesium excellent nutritional health insurance.

Parris Kidd, Ph.D., earned his doctorate in cell biology-zoology from the University of California, Berkeley. Beginning in 1984, while a National Institutes of Health (NIH)-funded research investigator at the University of California San Francisco (UCSF) Medical Center, he published authoritative texts on antioxidants that launched him into nutritional medicine. In 1994, Kidd helped establish phosphatidylserine (PS), then glycerophosphocholine (GPC). His brain formulas have earned awards from the dietary supplement industry. Kidd is chief science officer and director of quality for BrainMD Health. He collaborates with the Amen Clinics to develop clinically validated products for memory, mood, behavior and healthy aging.

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