

Magnesium Reduces Diabetes and Helps Keep You Young

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STORY AT-A-GLANCE

- › Magnesium is an essential mineral used in energy production, protein signaling and cell signaling in almost every organ and muscle in your body, especially your heart, bones and kidneys
- › Research found higher intake of magnesium was linked with a lower risk of diabetes, even when combined with eating foods with a high glycemic index
- › Magnesium insufficiency, or levels lower than supports optimal health but not low enough to trigger symptoms of deficiency, are associated with over 22 different medical conditions, including diabetes, heart disease and infertility
- › Insufficiency is related to a higher rate of aging but may be prevented by consuming foods high in magnesium, protecting your gut health, using supplements and Epsom salt baths

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Magnesium is an essential mineral used in pathways for energy production, protein synthesis and cell signaling.¹ The mineral is involved in nearly 300 metabolic reactions.² It is used by every organ and muscle in your body, especially your heart, kidneys and bones. Deficiency and insufficiency have been associated with a number of health conditions, including heart disease, Type 2 diabetes, hypertension and [osteoporosis](#).

In the care of pregnant women, magnesium sulfate is used to prevent seizures in women suffering from pre-eclampsia or eclampsia, a pregnancy complication that can result in

[high blood pressure](#), seizures and coma, threatening the life of the mother and baby.³

You might assume that a simple blood test would reveal a magnesium deficiency, but 60% is stored in your skeleton, 27% in your muscles and only 1% is found outside of your cells.⁴ To determine your levels you'll need a magnesium RBC test that can be done without a physician's order, except in the state of New York.⁵ Dr. Carolyn Dean, author of "The Magnesium Miracle," recommends a level of 6.0 to 6.5 milligrams per deciliter (mg/dL).

Are You at Risk?

The U.S. recommended dietary allowance (RDA) for magnesium is between 310 and 420 mg per day, depending upon your age and sex.⁶ However, this RDA is based on achieving a blood level lower than Dean believes will maintain optimal health.

Dr. Danine Fruge, associate medical director at the Pritikin Longevity Center in Florida, told CNN:⁷ "Studies have shown that only about 25% of U.S. adults are at or above the recommended daily amount of 310 to 320 mg for women and 400 to 420 [mg] for men."

The 2005-2006 National Health and Nutrition Examination Survey showed less than 50% of Americans had adequate intake to meet the RDA standard.⁸ Another study found 68% didn't meet the RDA for [magnesium intake](#) and 19% of people ate less than half the recommended amount.⁹

Dean points out that in a population where nearly 80% are deficient in optimal levels of magnesium, a common laboratory normal range of 4.2 to 6.8 mg/dL is not enough to deter symptoms of insufficiency.¹⁰

You may carefully watch your magnesium intake from your daily nutrition, but there are factors that may reduce your absorption, such as an unhealthy gastrointestinal tract,¹¹ daily consumption of coffee, soda or alcohol, heavy menstrual periods, excessive sweating or prolonged stress.¹² How well you absorb magnesium in your diet may also depend upon how much you consume and your overall nutrition.¹³

It is easy to understand how many are deficient. While consuming less than the low RDA recommendation, many also drink coffee and soda daily and/or suffer from an unhealthy gut microbiome that may impede absorption of magnesium from the diet.

Since magnesium is essential to nearly every cell and many biological functions, it could easily be considered one of the most important nutrients for optimal health. Research has now demonstrated magnesium plays a fundamental role in the prevention of Type 2 diabetes.¹⁴

Diabetes Is a Foundational Problem in Western Society

Type 2 diabetes results when insulin resistance progresses to a point where your blood glucose levels are elevated well above the expected normal high of 100 mg/dL. Prior to the development of diabetes, you may experience prediabetes. This is a condition in which insulin resistance has begun to develop, often called "borderline diabetes." The number of individuals who suffer from either condition continues to rise precipitously.

According to the U.S. Centers for Disease Control and Prevention (CDC), prevalence estimates for total **diabetes** in 2001 to 2004 were 10.3%, and 13.2% in 2017–2020.¹⁵ A 2017 study also estimated that between 2015 and 2030, the prevalence of diabetes will increase by 54% – that means more than 54.9 million Americans will be diagnosed with this disease.¹⁶

Type 2 diabetes places you at risk for a number of other dangerous and life-threatening health conditions, including kidney disease, heart disease, hypertension, stroke and blindness.¹⁷ Previous research has demonstrated higher intake of magnesium is associated with a lower risk of diabetes.¹⁸ According to a 2017 study, even those making poor dietary choices enjoyed protection against diabetes if they had a high intake of magnesium.¹⁹

To evaluate their assumption that higher intake of magnesium may be linked to lower incidence of diabetes, even when making poor carbohydrate choices, researchers

looked at the diet habits of people enrolled in the Nurses' Health Study and Health Professionals Follow-Up Study.

They calculated the hazard ratios and adjusted for factors such as age, body mass index, history, processed meat intake and other physical factors that may have increased the risk of over 17,000 participants who developed Type 2 diabetes in 28 years.

They found those who consumed the highest amount of magnesium had a 15% lower risk of developing diabetes over those who consumed the least amount. The researchers also found higher consumption of magnesium in people who consumed foods with a high glycemic index was even more strongly tied to a reduced risk of developing Type 2 diabetes.²⁰

Magnesium Deficiency May Speed Aging

In an effort to understand the impact magnesium may have on the capacity of cells to replicate and the integral part this plays in the development of disease, researchers analyzed the cell division of cultured human fibroblasts in the presence of adequate and inadequate magnesium.²¹

They found that while cells would divide and survive under moderate magnesium depletion, the cells also aged faster than those grown under normal magnesium concentrations.²² David Killilea, Ph.D., lead author of the study, said:²³

"Magnesium deficiency affects the way the cells age. Accelerated cellular ageing affects the way tissue functions. We are now thinking that cellular consequences of magnesium deficiency may be driving long-term chronic disease. You could be moderately deficient for a long time and not know it."

Depression is another health condition affected by your magnesium levels that can shorten your life span. Looking at six decades of mental health and mortality data, researchers found an association between premature death and depression.²⁴

Magnesium plays a key supporting role in healthy neurological function and mental health.²⁵ Research demonstrates that magnesium insufficiency may be a causative factor in the development of depression, anxiety and stress-related conditions.

Co-author with Killilea, Bruce Ames, Ph.D., used the study of magnesium impact on fibroblast replication within a larger theory of how micronutrients affect your health over your lifetime. His Triage Theory of Aging hypothesizes that moderate micronutrient deficiencies, often not enough to produce symptoms, may lead to accelerated aging and related diseases.²⁶ During his presentation, Ames said:

"Triage theory predicts that the consequence of moderate shortages of even a single micronutrient, though insufficient to cause overt clinical symptoms, will impair functions essential for long-term health. This impairment will result in insidious damage (e.g., increased DNA damage) that, over time, leads to the acceleration of age-associated diseases (e.g. increased cancer).

As people with modest deficiencies have no overt clinical symptoms, there has been little incentive to correct these deficiencies, though this could change if it can be shown that they are resulting in biochemical changes (e.g., chromosome breaks that are markers of increased risk of age-related diseases, such as cancer)."

Heart Health Affects Longevity

Magnesium may play a significant role in the aging process when you suffer from insufficiency in amounts that are not low enough to cause recognizable symptoms of magnesium deficiency. Initially interested in cancer prevention, Ames wrote nearly 500 research papers during his professional career as his attention turned to the aging process and mitochondrial health.²⁷

An increased intake of magnesium has been associated with improved **cardiovascular health** and a 30% reduction in cardiovascular risk, including ischemic heart disease.²⁸

Studies have demonstrated that magnesium also has a significant impact on arterial stiffness that may be a precursor to high blood pressure and heart disease.

Magnesium helps prevent vascular calcification through multiple mechanisms, and in end-stage kidney disease there is an association between adequate amounts of serum magnesium and survival.²⁹ Acting through two distinct pathways, magnesium plays a vital role in supporting arterial smooth muscle function and promoting arterial flexibility.

Role of Magnesium Sulfate in Pain Management

Research shows **magnesium sulfate** also plays a role in postsurgical pain management. Magnesium acts as a natural calcium channel blocker,³⁰ which is important in pain processing.³¹ Research has demonstrated that magnesium administration during surgery reduced the need for intraoperative fentanyl.³²

Another study concluded postoperative administration reduced pain and the need for opioids after a thoracotomy.³³ Thoracotomy surgeries are painful and require planned pain management to improve patient outcomes. In an effort to determine if the administration of magnesium could also reduce the use of **opioid drugs** after surgery, researchers analyzed the result of using magnesium post-operatively.

In the second study, all patients received morphine in the recovery room, but the magnesium group also received an intravenous infusion of magnesium. A total number of 24 patients completed the study. Those who received magnesium infusion used significantly less morphine for pain control at four and eight hours after surgery, without any discernable difference in pain or sedation scores.³⁴

The incidence of nausea and vomiting was similar in the two groups, but those who received magnesium stayed in the hospital an average of one day less than those who did not receive magnesium. The researchers also concluded that magnesium infusion did not cause any adverse side effects.

Another study found similar results in patients who had undergone a hysterectomy and received post-surgical intravenous magnesium sulfate.³⁵ Forty women were assigned

randomly to two groups; one received magnesium post-surgically and the second group received normal saline. After receiving the same anesthesia, the group who received a single dose of magnesium had lower pain scores over the first 24 hours and lower use of pain medication.

Magnesium Deficiency May Trigger More Health Conditions

As magnesium is essential to nearly 300 biochemical reactions, it is not surprising that it has also been associated with a reduced risk of several other health conditions. Researchers have identified over 3,700 binding sites on human proteins that indicate the role magnesium plays in disease may have been greatly underestimated.³⁶

Dean has studied and written about magnesium since the late 1990s. In her book, "The Magnesium Miracle," she identifies over 25 different medical conditions an insufficiency or deficiency may cause or trigger that have been proven through scientific study. These include:³⁷

Anxiety	Asthma	Chronic back pain
Blood clots	Bowel disease	Cystitis
Dental caries (tooth decay)	Depression	Detoxification
Diabetes	Fatigue	Fibromyalgia
Heart disease	Hypertension	Hypoglycemia
Infertility	Insomnia	Kidney disease
Liver disease	Migraine	Menstrual cramps
Nerve problems	Osteoporosis	PMS
Pre-eclampsia	Panic attack	Raynaud's syndrome

Tinnitus (ringing in your ears)³⁸

Magnesium May Play a Nutritional Role in EMF Protection

The physiological effects caused by exposure to electromagnetic fields (EMF) appear to be blocked by calcium channel blockers. In this interview, Martin Pall, Ph.D., explains that EMF activates voltage-gated calcium channels in your cells, allowing excess calcium to flood into the cells. This is responsible for most of the biological effects of EMF.

Exposure to EMF is a hidden health risk you'll find inside most buildings and your home. Your cellphone, cordless phone, internet router and microwave oven all emit EMF waves that cause massive mitochondrial dysfunction linked to chronic diseases such as cardiac arrhythmias, depression, anxiety, Alzheimer's disease and infertility.

A natural solution to prevent the activation of these voltage-gated calcium channels is to use magnesium, which is a natural calcium channel blocker. However, this is a short-term preventive.

To protect your health in the long term, you really need to address EMF sources in your home and office. That said, a magnesium deficiency could speed the damage EMF does to your mitochondria and your health. Read more about EMF and its dangers in my previous article, "[Addressing EMF Pollution – A 21st Century Health Imperative.](#)"

Epsom Salt Baths May Help Supplement Your Diet

While it is ideal to obtain your magnesium from your diet, there are times when supplementation may be necessary to maintain optimal levels. If you suffer from leaky gut, inflammatory bowel disease or other intestinal disorders, absorption may be impaired.

If you have a history of heart disease, hypertension, heart attack or have a planned open-heart surgery or heart transplant, then supplementation may be necessary to raise your magnesium levels.

A relaxing way to raise your magnesium sulfate level is to take Epsom salt baths or foot baths. Transdermal absorption of magnesium has been used to increase magnesium levels and bypass gastrointestinal absorption. A pilot study by R.H. Waring from the University of Birmingham, U.K., found that taking a bath in 122 degrees Fahrenheit (F) or 50 Celsius (C) water for 12 minutes increased serum levels of magnesium in the participants.³⁹

The optimal temperature for a bath to wash away the dirt and grime from your day is 112 degrees F.⁴⁰ Tap water can be as hot as 140 F (60 C) but doctors recommend setting your hot water heater to 120 F (48 C) to prevent a burn injury, especially to children.

Transdermal magnesium cream has also demonstrated results by increasing serum magnesium levels in study participants.⁴¹ The benefit to using Epsom salt baths or transdermal creams is the absorption bypasses gastrointestinal absorption challenges in many who suffer from leaky gut or other bowel conditions.

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