Herbs & Supplements:

Magnesium

Supplement Forms / Alternate Names
• Magnesium Chloride; Magnesium Citrate; Magnesium Fumarate; Magnesium Gluconate; Magnesium Malate; Magnesium Oxide; Magnesium Sulfate

Principal Proposed Uses
• Diabetes; Hypertension (High Blood Pressure); Kidney Stones; Migraine Headaches; Noise-related Hearing Loss

Other Proposed Uses
• Angina; Asthma; Atherosclerosis; Autism; Congestive Heart Failure; Coronary Artery Disease; Fatigue; Fibromyalgia; Glaucoma; Low HDL ("Good") Cholesterol; Mitral Valve Prolapse; Osteoporosis; Painful Menstruation (Dysmenorrhea); PMS; Preeclampsia; Pregnancy-induced Leg Cramps; Restless Legs Syndrome; Stroke

Not Recommended Uses
• Following a Heart Attack

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Magnesium is an essential nutrient, meaning that your body needs it for healthy functioning. It is found in significant quantities throughout the body and used for numerous purposes, including muscle relaxation, blood clotting, and the manufacture of ATP (adenosine triphosphate, the body's main energy molecule).

It has been called "nature's calcium channel blocker." The idea refers to magnesium's ability to block calcium from entering muscle and heart cells. A group of prescription heart medications work in a similar way, although much more powerfully. This may be the basis for some of magnesium's effects when it is taken as a supplement in fairly high doses.

Requirements/Sources

Requirements for magnesium increase as we grow and age. The official U.S. and Canadian recommendations for daily intake are as follows:

Infants 0–6 months, 30 mg
7–12 months, 75 mg
Children 1–3 years, 80 mg
4–8 years, 130 mg
Males 9–13 years, 240 mg
14–18 years, 410 mg

19–30 years, 400 mg
31 years and older, 420 mg
Females 9–13 years, 240 mg
14–18 years, 360 mg
19–30 years, 310 mg
31 years and older, 320 mg
Pregnant women 18 years and younger, 400 mg
19–30 years, 350 mg
31–50 years, 360 mg
Nursing women 18 years and younger, 360 mg
19–30 years, 310 mg
31–50 years, 320 mg

Note: These recommendations refer to total intake from food plus supplements. The average diet provides a daily intake of magnesium very close to these amounts.

In the United States, the average dietary intake of magnesium is lower than the recommended daily allowance; however, it is unclear whether this truly indicates deficiency, or if the recommended allowance is too high.[1,2] Alcohol abuse, surgery, diabetes, zinc supplements, certain types of diuretics (thiazide and loop diuretics, but not potassium-sparing diuretics), estrogen and oral contraceptives, and the medications cisplatin and cyclosporin have been reported to reduce your body's level of magnesium or increase magnesium requirements.[3,4,5,88–92] If you are taking potassium supplements, you may receive greater benefit from them if you take extra magnesium as well.

While it is sometimes said that calcium interferes with magnesium absorption, this effect is apparently too small to have a significant effect on overall magnesium status.[8,9]

Kelp is very high in magnesium, as are wheat bran, wheat germ, almonds, and cashews. Other good sources include blackstrap molasses, brewer's yeast (not to be confused with nutritional yeast), buckwheat, nuts, and whole grains. You can also get appreciable amounts of magnesium from collard greens, dandelion greens, avocado, sweet corn, cheddar cheese, sunflower seeds, shrimp, dried fruit (figs, apricots, and prunes), and many other common fruits and vegetables.

Therapeutic Dosages

A typical supplemental dosage of magnesium ranges from the nutritional needs described above to as high as 600 mg daily. For premenstrual syndrome (PMS) and dysmenorrhea (painful menstruation), an alternative approach is to start taking 500 to 1,000 mg daily, beginning on day 15 of the menstrual cycle and continuing until menstruation begins.

Magnesium citrate may be slightly more absorbable than other forms of magnesium.[100]

Therapeutic Uses

Preliminary double-blind studies suggest that regular use of magnesium supplements may help prevent migraine headaches,[10–12,101] hearing loss caused by exposure to loud noises,[13] and kidney stones,[14] and help treat high blood pressure,[15–18] angina,[19,97,115] dysmenorrhea (menstrual cramps),[21,22] pregnancy-induced leg cramps,[41] and PMS (including menstrual migraines).[23,24]

People with diabetes are often deficient in magnesium,[27–29] and according to some (but not all) studies, magnesium supplementation may enhance blood sugar control and insulin sensitivity in people with diabetes or prediabetic conditions.[98,102–109,118]

One study found that magnesium supplements might be helpful for people with mitral valve prolapse who also have low levels of magnesium in the blood.[99]

There is some evidence that magnesium may decrease the atherosclerosis risk caused by hydrogenated oils, margarine-like fats found in many "junk" foods.[20]

Studies on magnesium supplements for improving sports performance have returned contradictory results.[44–51]

Magnesium supplements do not appear to be very helpful, if at all, for preventing preeclampsia.[6,7,52,53,110] (Magnesium, taken by injection rather than orally, however, is probably helpful for *treating* preeclampsia that already exists.[69,76,77])

Magnesium is sometimes said to decrease symptoms of restless legs syndrome, but the evidence that it works consists solely of open trials without a placebo group, and such studies are not trustworthy.[25,26] (For information on why this is so, see Why Does the Natural Pharmacist Rely on Double-blind Studies?) Very weak evidence hints at possible benefits for insomnia.[111]

It is often said that magnesium supplements are essential for preventing or treating osteoporosis, but there is only minimal supporting evidence for this claim.[119-120]

Magnesium has also been suggested as a treatment for Alzheimer's disease, attention deficit disorder, fatigue, fibromyalgia, low HDL ("good") cholesterol, periodontal disease, rheumatoid arthritis, and stroke. However, there is virtually no evidence at all that it is helpful for any of these conditions.

Magnesium is sometimes advocated for stabilizing the heart after a heart attack, but one study actually found that use of magnesium slightly increased risk of sudden death, repeat heart attack, or need for bypass surgery in the year following the initial heart attack.[78] However, magnesium may be helpful in congestive heart failure.[112]

Despite some early enthusiasm, combination therapy with vitamin B_6 and magnesium has not been found helpful in autism.[30-40,78-81]

Alternative medical literature frequently mentions magnesium as a treatment for asthma. However, this idea seems to be based primarily on the use of intravenous magnesium as an emergency treatment for asthma. When you take something by mouth, it's a very different matter from having it injected into your veins. Studies of oral magnesium for asthma have shown more negative than positive results.[42,113,116] Inhaled, aerosolized magnesium, however, has shown some promise.[117]

Although magnesium is sometimes mentioned as a treatment to help keep the heart beating normally, a 6-month, double-blind trial of 170 people did not find it effective for preventing a particular heart rhythm abnormality called atrial fibrillation.[43] However, a small double-blind, placebo-controlled trial found that magnesium supplements reduced episodes of arrhythmia in individuals with congestive heart failure.[82] One possible explanation: People with congestive heart failure often take drugs (loop diuretics) that deplete magnesium. The combination of magnesium deficiency with digoxin (another drug given for CHF) may cause arrhythmias.[4,93-95] Thus, it is possible that the benefits seen here were caused by correction of that depletion.

One double-blind, placebo-controlled study failed to find magnesium helpful in glaucoma.[87]

What Is the Scientific Evidence for Magnesium?

Migraine Headaches

A double-blind study found that regular use of magnesium helps prevent migraine headaches. In this 12-week trial, 81 people with recurrent migraines were given either 600 mg of magnesium daily or placebo.[54] By the last 3 weeks of the study, the treated group's migraines had been reduced by 41.6%, compared to a reduction of 15.8% in the placebo group. The only side effects observed were diarrhea (in about one-fifth of the participants) and, less often, digestive irritation.

Similar results have been seen in other smaller double-blind studies.[55,56,114] One study found no benefit,[57] but it has been criticized on many significant points, including using an excessively strict definition of what constituted benefit.[58]

Noise-related Hearing Loss

One double-blind, placebo-controlled study on 300 military recruits suggests that 167 mg of magnesium daily can prevent hearing loss due to exposure to high-volume noise.[59]

Kidney Stones

Magnesium inhibits the growth of calcium oxalate stones in the test tube[60] and decreases stone formation in rats.[61] However, human studies have had mixed results. In one 2-year open study, 56 people taking magnesium hydroxide had fewer recurrences of kidney stones than 34 people not given magnesium.[62] In contrast, a double-blind (and, hence, more reliable) study of 124 people found that magnesium hydroxide was essentially no more effective than placebo.[63]

Hypertension (High Blood Pressure)

Magnesium works with calcium and potassium to regulate blood pressure. Several studies suggest that magnesium supplements can reduce blood pressure in people with hypertension,[64–67] although some have not.

Angina

In a double-blind, placebo-controlled trial of 187 people with angina, 6 months of treatment with magnesium at a dose of 730 mg daily improved exercise tolerance and enhanced overall quality of life.[97] Benefits were also seen in a similar, smaller double-blind trial.[68]

After a Heart Attack

In a 1-year, double-blind, placebo-controlled trial of 468 individuals who had just experienced a heart attack, use of a magnesium supplement at a dose of 360 mg daily failed to prevent heart-related events (defined as heart attack, sudden cardiac death, or need for cardiac bypass), and actually may have increased the risk slightly.[78]

Dysmenorrhea

A 6-month, double-blind, placebo-controlled study of 50 women with menstrual pain found that treatment with magnesium significantly improved symptoms.[70] The researchers reported evidence of reduced levels of prostaglandin F_2 alpha, a hormone-like substance involved in pain and inflammation.

Similarly positive results were seen in a double-blind, placebo-controlled study of 21 women.[71]

PMS Symptoms

A double-blind, placebo-controlled study of 32 women found that magnesium taken from day 15 of the menstrual cycle to the onset of menstrual flow could significantly improve PMS symptoms, specifically mood changes.[72]

Another small double-blind preliminary study found that regular use of magnesium could reduce symptoms of PMS-related fluid retention.[73] In this study, 38 women were given magnesium or placebo for 2 months. The results showed no effect after one cycle, but by the end of two cycles, magnesium significantly reduced weight gain, swelling of extremities, breast tenderness, and abdominal bloating.

In addition, one small double-blind study (20 participants) found that magnesium supplementation can help prevent menstrual migraines.[74]

Preliminary evidence suggests that the combination of magnesium and vitamin B_6 might be more effective than either treatment alone.[75]

Pregnancy-induced Leg Cramps

Pregnant women frequently experience painful leg cramping. One double-blind trial of 73 pregnant women found that 3 weeks of magnesium supplements significantly reduced leg cramps as compared to placebo.[83]

Safety Issues

The U.S. government has set the following upper limits for use of magnesium supplements:

Children 1–3 years, 65 mg
Children 4–8 years, 110 mg
Adults, 350 mg
Pregnant or nursing women, 350 mg

In general, magnesium appears to be quite safe when taken at or below recommended dosages. The most common complaint is loose stools. However, people with severe kidney or heart disease should not take magnesium (or any other supplement) except on the advice of a physician. Maximum safe dosages have not been established for young children. There has been one case of death caused

by excessive use of magnesium supplements in a developmentally and physically disabled child.[84] Pregnant or nursing women should not exceed the nutritional dosages presented under Requirements/Sources.

If taken at the same time, magnesium can interfere with the absorption of antibiotics in the tetracycline family,[85] and, possibly, the drug nitrofurantoin.[86] Also, when combined with oral diabetes drugs in the sulfonylurea family (Tolinase, Micronase, Orinase, Glucotrol, Diabinese, DiaBeta), magnesium may cause blood sugar levels to fall more than expected.[86]

Interactions You Should Know About

If you are taking

Potassium supplements, manganese, loop, and thiazide diuretics, oral contraceptives, estrogen-replacement therapy, cisplatin, digoxin, or medications that reduce stomach acid: You may need extra magnesium.
Antibiotics in the tetracycline family or nitrofurantoin (Macrodantin): You should separate your magnesium dose from doses of these medications by at least 2 hours to avoid absorption problems.
Oral diabetes medications in the sulfonylurea family: Work closely with your physician when taking magnesium to avoid hypoglycemia.
Amiloride: Do not take magnesium supplements except on medical advice.[77]

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