

APPLICATIONS

- Muscle Support
- Energy Production
- Mineral Support
- Bone Health
- Sleep Support
- Antioxidant support
- Stress Management



INTRODUCTION

Magnesium is an essential mineral in the human diet. It is the second most abundant intracellular cation (Mg^{2+}) and is involved in more than 350 enzymatic reactions and over 80% of metabolic functions.^{1,2,3} Magnesium is needed for cellular energy metabolism, DNA transcription, RNA synthesis, membrane stabilization, and calcium metabolism, among many other functions.^{1,2} Magnesium may help to support muscular, skeletal, and neural health.^{*1,2,4} Dietary magnesium may be found in seeds such as pumpkin and chia; nuts and their butters such as almonds, cashews and peanuts; legumes such as black beans, kidney beans, and edamame; and spinach, among others.⁵ It can also be found in hard water, due to the high mineral content.⁶ Magnesium intake is often inadequate,⁷ and subclinical deficiency occurs before serum magnesium levels are impacted.⁸ Because of this, serum magnesium levels do not reliably correlate with either total body magnesium or amounts in specific tissues.⁹

Malic acid is commonly found in apples and other fruits. It is often added to food products to contribute a sour taste. Malic acid in the form of malate is an important part of the Krebs cycle, which helps to metabolize food into energy in the form of ATP. It may also help to support overall muscle health.*

In magnesium malate, magnesium is bound to malic acid. Magnesium levels depend on intestinal absorption and renal excretion.² Magnesium malate has been found to be more bioavailable than many of its magnesium counterparts.* In a single-dose rat study, magnesium malate had the highest area under the curve followed by magnesium acetyl taurate, while magnesium citrate and magnesium oxide had the lowest bioavailability.^{*10} A small single-center, randomized, double-blind, four-arm crossover trial with 14 healthy adults found similar results, with

dimagnesium malate significantly more bioavailable than magnesium oxide.^{*11} Magnesium malate may help to support muscle health and energy production more than either magnesium or malic acid alone, due to different mechanisms of support.*

Our magnesium malate is free of dairy, soy, gluten, sugar, yeast, and mold. It is cGMP NSF Certified (ANSI Standards 173 Section 8), as well as FDA (Food and Drug Administration) and FSMA (Food Safety Modernization Act) Compliant. It is also kosher certified, halal certified, and suitable for vegetarians and vegans.

MUSCLE SUPPORT

Magnesium plays an important role in energy metabolism, and may help to support and maintain skeletal muscle health.^{*12} It may also support skeletal muscle relaxation.^{*13} Malic acid may assist with skeletal muscle support by helping to maintain lactic acid levels already within the normal range.^{*14} Magnesium and malic acid work synergistically to support skeletal muscle health.* Additionally, magnesium may help to support both cardiac and smooth muscle, helping to maintain both cardiac and vascular health.^{*15} Because of this, magnesium may help to maintain cardiac output and peripheral vascular resistance already within the normal range.^{*15}

ENERGY PRODUCTION

Magnesium helps to create energy in the form of ATP from dietary sources, and may support the utilization of other essential nutrients.* Magnesium may also help to support healthy daytime energy levels in women.^{*16} In a study with healthy male volleyball players, compared to control, the magnesium group had post-exercise lactic acid levels significantly closer to normal, suggesting that magnesium supplementation can support metabolism under anaerobic conditions.^{*17} Malic acid may help to maintain serum lactate levels within the normal range during and after exertion.^{*14} Together, magnesium and malic acid play important roles in energy production via ATP, under both aerobic and anaerobic conditions.^{*14,17}

OTHER USES

Mineral Support

Given that magnesium intake is often inadequate, magnesium intake may benefit from support.^{*7} For prevention of deficiency, the RDA for elemental magnesium in ages 19-30 is 310 mg/day for women and 400 mg/day for men.⁵ In ages 31 and older, the RDA is 320 mg/day for women and 420 mg/day for men.⁵

Bone Health

Approximately 50% of the body's magnesium is located within bone, where it contributes to structural integrity.² Magnesium is a cofactor for the synthesis, transport, and activation of vitamin D,^{18,19} and may also help to regulate calcium absorption.² Magnesium's role in both of these processes helps to support and maintain healthy bones.^{*2,18}

Sleep Support

Magnesium may help to support healthy sleep by supporting healthy NMDA and GABA levels already within the normal range.^{*20} It may also help to maintain healthy sleep quality.^{*21}

Antioxidant support

Magnesium may help to contribute antioxidant activity, as it is a cofactor of superoxide dismutase and other antioxidant enzymes.^{*22,23,24}

Stress Management

Magnesium may help to support relaxation and stress management in everyday stress.^{*25,26}

SAFETY AND CAUTIONS

Magnesium is generally well-tolerated. At higher doses, loose stools and/or gastrointestinal irritation can occur. This is less likely to occur in doses under 350 mg per day.³ Do not take magnesium with levodopa/carbidopa, as it may reduce the bioavailability of levodopa/carbidopa.²⁷ When taken with aminoglycoside antibiotics, magnesium can increase the risk of neuromuscular weakness.²⁸ Magnesium can decrease the absorption of bisphosphonates when taken concurrently, and doses should be separated by at least two hours.²⁹ Magnesium may decrease the absorption of quinolone antibiotics, which should be taken at least 2 hours before, or 4-6 hours after magnesium.²⁹ It may also decrease the absorption of tetracyclines,³⁰ as well as the absorption of digoxin.³¹ Magnesium may have additive effects with calcium channel blockers,³² and may increase the risk for ketamine toxicity.³³ It may also increase the absorption of sulfonyleureas.³⁴ Use caution when taking magnesium with potassium-sparing diuretics, as these can decrease magnesium excretion and increase magnesium levels.³⁵

Malic acid is generally recognized as safe (GRAS) in food and food products. As a supplement, it is generally well-tolerated. While one study has shown that malic acid may cause loose stools, it may have been due, instead, to the magnesium that was taken concurrently.²⁹ In one animal study, malic acid derived from tagetes root was shown to decrease blood pressure.³⁶ As with magnesium, malic acid may have additive effects with antihypertensives.

Safety not documented in breastfeeding or pregnant women, or in children under 3 years of age due to insufficient safety research.

*** This statement has not been evaluated by the Food and Drug Administration. This product is not intended to treat, cure, or prevent any diseases.**

NutraMedix

MAGNESIUM MALATE

SUPPORTS MUSCLES AND ENERGY PRODUCTION †

Dietary Supplement
120 Vegetable Capsules

Supplement Facts

Amount Per Serving	% Daily Value
Magnesium (from dimagnesium malate, (Albion™))	200 mg 50%

Other Ingredients: Vegetable Capsule, Vegetable Magnesium Stearate

GLUTEN, SUGAR & DAIRY FREE

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