



# Mag-Malate

Magnesium Amino Acid Chelate & Malic Acid



Absolute Health  
Internal Medicine & Pediatrics

## DESCRIPTION

Mag-Malate tablets, provide magnesium and malic acid, two key nutrients involved in energy production. Mag-Malate provides magnesium as an Albion glycine/lysine amino acid chelate, which has superior absorption and is highly tolerated.

## DISCUSSION

Adenosine triphosphate (ATP) is the body's primary form of energy currency. The hydrolysis of ATP to adenosine diphosphate (ADP) and phosphate is the predominant reaction used to create energy for physiological processes. Thus, generation of ATP is the central goal of energy production

There are numerous routes of ATP production. Three primary methods for generating ATP in skeletal muscle include immediate, high intensity ATP production, nonoxidative energy production, and oxidative energy production. Immediate, high intensity ATP production can be achieved through two primary reactions: the combination of ADP and inorganic phosphate and the donation of a phosphate from creatine phosphate to ADP. Both of these systems are used for quick, intense energy production in the muscles. Nonoxidative energy production, or glycolysis, occurs in the anaerobic cytosol. Oxidative energy production, a collective term often used to describe the Krebs' cycle and the electron transport system (ETS), occurs in the aerobic environment of the mitochondria.

Energy production within the body is a complicated process, involving numerous enzymes, cofactors, and substrates. Among those substances crucial to ATP generation are magnesium and malic acid.

**Magnesium:** Magnesium is a trace mineral that is essential for energy metabolism. It is required as a cofactor of enzymes in all three modes of ATP production in the muscle. In immediate, high intensity energy production, magnesium serves as an essential enzyme cofactor in both the conversion of ADP and inorganic phosphate to ATP and for the conversion of ADP and creatine phosphate to ATP and creatine. During glycolysis, magnesium is required for many reactions, including that which allows pyruvate to be transformed into Acetyl Coenzyme A, the step that bridges anaerobic and aerobic energy production. This step is especially important as it allows the opportunity to derive maximum energy by accessing the Krebs' cycle and ETS. These final stages of energy production are the most productive in terms of ATP generation. Once again, magnesium is an essential cofactor in numerous enzymes that catalyze the reactions that drive these energy production systems, especially the Krebs' cycle.

**Malic Acid:** Malic acid, in the form of malate, is an important component of the Krebs' cycle. In aerobic conditions, malate is converted to oxaloacetate, generating the fourth of four reducing agents produced by the Krebs' cycle. Once generated, these reducing agents are used in the ETS to generate ATP. Malate is also an integral component of the malate-aspartate shuttle, which shuttles reducing equivalents produced in the cytosol into the mitochondria for use in energy production.

Although there are many steps in the Krebs' cycle, studies have shown that of all the Krebs' cycle intermediates, only malic acid seems prone to depletion upon extreme physical exertion. Supplemental malic acid has been shown in research studies to increase the amount of malate in mitochondria, and thus increase the energy production capacity of the cell.

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**\*These statements have not been evaluated by the Food and Drug Administration.  
This product is not intended to diagnose, treat, cure, or prevent any disease.**



# Supplement Facts

Serving Size 1 Tablet  
Servings Per Container 90

Amount Per Serving	%DV
Magnesium..... 100 mg (as magnesium amino acid chelate/oxide)	25%
Malic acid..... 400 mg	*

\*Daily Value not established.

Other ingredients: Cellulose, hydroxypropyl cellulose, carboxymethylcellulose, stearic acid, silica, vegetable stearate, hydroxypropyl methylcellulose, glycerin and water

## SUGGESTED USE

Two tablets daily as a dietary supplement or as directed by a physician.

Despite their crucial role in energy production, many people do not obtain sufficient amounts of magnesium or malic acid from their diet. Rich sources of magnesium include dark leafy greens, whole grains, nuts, and legumes. Malic acid occurs naturally in certain fruits, such as apples and apricots. Depleted levels of either of these nutrients can have a negative impact on energy production capabilities. Therefore, supplementation with highly bioavailable forms of magnesium and malic acid may have beneficial effects on energy production capacity.

## INDICATIONS

Mag-Malate may be a useful nutritional adjunct for individuals who wish to support energy metabolism and muscle function.

## SIDE EFFECTS

No adverse effects have been reported.

## STORAGE

Store in a cool, dry place, away from direct light. Keep out of reach of children.

## REFERENCES

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- Russell IJ, et al. Treatment of fibromyalgia syndrome with Super Malic: a randomized, double-blind, placebo controlled, crossover pilot study. J Rheumatol 1995;22(5):953-958.

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