



Magnesium

Why is Magnesium important?

Magnesium, like all other electrolytes, is important to the human body. It is required for over 300 functions in the body. Electrolytes help regulate your acid-base balance, pH of your blood, osmotic gradients, and muscles contractions, both cardiac and skeletal. Magnesium is an intracellular cation, which means it resides inside of your cells and has a positive charge, specifically a 2+ charge. Magnesium is small, meaning it can move more easily in your body, it has high mobility, and it likes to bind to substances that contain oxygen. Magnesium binds to albumin, a protein in your blood that helps maintain your osmotic gradient. More importantly it helps with many ATP generating reactions. ATP is the body's main energy source. It helps with using glucose, synthesizing fats, proteins, and nucleic acids, and muscle contractions. Magnesium is especially important for those who participate in sports or workout on a regular basis. If you are working out often or playing sports, you need to be consuming more magnesium to perform well because the demand is higher. Being either deficient or having an overabundance of magnesium can cause a plethora of issues in the human body.

Osmotic Gradients: Gradients in your blood, especially your kidney's, that govern the amounts of certain minerals and nutrients that your body either reabsorbs or secretes by urination.

What Body Functions is Magnesium Important for?

Carbohydrate Metabolism: Regulates enzymes involved in glycolysis, glucose homeostasis, and insulin action.

Regulates Ion Channels: Creates inhibitory effect on potassium chloride cotransporters, which influences the potassium balance between your intracellular environment and your extracellular environment. It stimulates sodium and potassium influx and efflux.

Calcium Blocker: Competes for binding sites with calcium and inhibits calcium activity, this can influence muscular and neuron activity. Benefits include lowered blood pressure and risk for cardiovascular events.

Bone Remodeling/Metabolism: Magnesium plays a very important role, working with calcium, on your bones. Magnesium activates Vitamin D which plays a crucial role in absorbing calcium. It can either stimulate bone growth by up taking calcium in your blood, or it can stimulate bone break down to raise your blood calcium levels.

Different Types of Magnesium:

Magnesium Citrate: This is an organic form of magnesium that is attached to citric acid, found in citrus fruits. This form of magnesium is more easily absorbed by the body making it more bioavailable. **This can be used beneficially to treat constipation.**

Magnesium Oxide: This is an inorganic form of magnesium that is usually cheaper and found in more supplements; however, magnesium oxide isn't absorbed very well which can cause gastric irritation if too much is taken. **This can be used beneficially to treat constipation.**

Magnesium Glycinate: This form of magnesium is bonded to glycine molecules. This form of magnesium helps regulate neurotransmitters, GABA (gamma-aminobutyric acid), and melatonin. **This all helps lower levels of anxiety and calm your mind making it easier to fall asleep and stay asleep.**

Magnesium Sulfate: This form of magnesium has been used in pregnant patients to either reduce their risk of eclampsia or for treatment of eclamptic patients. When you are pregnant your body has a higher physiological need for magnesium and a lot of people don't realize that you need to consume more magnesium to keep your levels where they need to be.

Magnesium Hydroxide: This form of magnesium is a more bioavailable form than magnesium oxide. This allows for better absorption. **It can be used as an antacid or laxative.**

Magnesium Gluconate: **This is used to treat low blood magnesium levels.** Very bioavailable and easily absorbed and used by your body. May also be beneficial to treat muscle cramps, anxiety, and help improve cardiovascular health.

Magnesium Chloride: **This is a magnesium salt that is used to treat low blood magnesium levels.** Most people take this to boost their dietary intake of magnesium to help with certain conditions. Magnesium chloride has uses in raising blood magnesium levels especially those who are type 2 diabetics. It has also been proven to improve bone health, reducing your risk of osteoporosis, regulating blood pressure, and even prevent migraines.

Magnesium Lactate: This form of magnesium has been found to help with skeletal and cardiac muscle contractions. This is important for maintaining good cardiac health and have a healthy heart rhythm as well as being able to use your skeletal muscles to the best of their abilities.

Food Sources Magnesium is Found in:

Seeds/Nuts	Mg/Serving
Hemp Seeds (1 ounce)	700
Pumpkin Seeds (1 ounce)	535
Flax Seeds (1 ounce)	392
Brazil Nuts (1 ounce)	376
Almonds (1 ounce)	80
Cashews (1 ounce)	74
Carbohydrates	Mg/Serving
Whole Wheat Bread (2 slices)	46
Baked Potato	43
Brown Rice (½ cup)	42
Kidney Beans (½ cup)	35
Greens	Mg/Serving
Boiled Spinach (½ cup)	78
Swiss Chard (½ cup)	75
Avocado (1 cup)	44
Collard Greens (½ cup)	25
Cooked Broccoli (½ cup)	12
Others	Mg/Serving
Dark Chocolate (1 ounce)	64
Yogurt (8 ounces)	42
Milk (8 ounces)	24-27
Farmed Atlantic Salmon (3 ounces)	26
Cooked Halibut (3 ounces)	24
Roasted Chicken Breast (3 ounces)	22
Cooked Beef (3 ounces)	20

Signs and Causes of Magnesium Deficiency:

Many things play a role in why people are deficient in Magnesium. Increasing use of pesticides and fertilizers are depleting the soil of certain minerals like Magnesium. Depletion of magnesium from soil also comes from monoculture agriculture. Monoculture agriculture is the practice of only planting one type of crop in a certain area. Because certain crops use certain minerals to grow replanting the same crop uses the same minerals causing less and less of those minerals to be in the soil. Other causes of Magnesium depletion are how food is processed. Inorganic foods tend to have less nutrients due to the use of pesticides and herbicides. Other reasons for magnesium deficiency are certain medications (antacids, certain antibiotics, and hypertension drugs), Vitamin D deficiency, drinking alcohol, type 1 or 2 diabetes, and aging. Magnesium deficiency is the most common mineral deficiency.

Neuromuscular Signs of Magnesium Deficiency: This can include weakness, tremors, muscle twitching, dysphagia (difficulty swallowing), and positive Chvostek's sign (facial twitching in response to tapping facial nerve).

Cardiac Signs of Magnesium Deficiency: Can cause arrhythmias and ECG (electrocardiogram) changes.

Central Nervous System Magnesium Deficiency: Can cause depression, agitation, psychosis, nystagmus (uncontrolled eye movement), and seizures.

Gastrointestinal Loss of Magnesium: Diarrhea and vomiting can cause magnesium deficiency. People that have Celiac or Chron's disease are deficient in magnesium. When your gastrointestinal tract isn't functioning properly or has been damaged in some way, its ability to absorb magnesium is hindered.

Renal (kidneys) Loss of Magnesium: Any damage to your kidneys can cause issues with reabsorbing needed minerals.

Diabetes mellitus/insulin resistance: When you have uncontrolled diabetes, or you do not break down and absorb glucose like you should, you will have a higher blood glucose level. Your body wants to get your blood glucose levels into its normal range, so you will end up excreting out more glucose in your urine. An unfortunate side effect of this is that when you are excreting more glucose you end up also excreting more magnesium which can cause a magnesium deficiency.

Alcoholism: A lot of people that suffer from alcoholism don't eat in the way they should. This can cause less magnesium to be consumed. Alcoholism can also cause gastrointestinal problems resulting in decreased magnesium absorption.

If you are pregnant or lactating your body requires more magnesium to meet its physiological needs.

*hypomagnesemia = low blood magnesium levels

Signs and Causes of Magnesium Toxicity:

Magnesium toxicity is simply too much magnesium. This can come from eating too much magnesium rich foods, supplementing too much magnesium, or taking drugs that effect magnesium absorption. The biggest cause of magnesium toxicity is renal insufficiency. This means that your kidneys are not working properly and cannot clear magnesium as well from your system leading to a buildup.

Signs of magnesium toxicity: mild to severe hypotension, muscle weakness, severe back and pelvic pain, confusion and loss of consciousness, difficulty breathing to respiratory arrest, and cardiac arrhythmias to cardiac arrest.

*hypermagnesemia = high blood magnesium levels

Supplementation of Magnesium:

Magnesium should only be supplemented if you are deficient in magnesium. If you take magnesium supplements when not deficient it can have a negative effect on your health.

Supplementation of magnesium can lower risk of hypertension, cardiac death, postmenopausal osteoporosis, insulin resistance, muscle cramps or weakness, increase your energy levels, improve sleep, and even your mood.

***It is important to know that dietary intake of magnesium should be your main source of magnesium, and any magnesium supplements should supplement the magnesium you are already ingesting.**

Daily Recommended Dose of Magnesium:

Age	Male	Female	Pregnancy	Lactation
Birth to 6 Months	30	30		
7 to 12 months	75	75		
1-3 years	80	80		
4-8 years	130	130		
9-13 years	240	240		
14-18 years	410	360	400	360
19-30 years	400	310	350	310
31-50 years	420	320	360	320
51+ years	420	320		

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