Magnesium

A complete primer.

Why it's important.
How it works.
How it can help you.

CanPrev™
PREMIUM NATURAL HEALTH PRODUCTS

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Thanks again, and please enjoy the read!

The CanPrev Team.

Written & edited by Norman Goh
Designed & illustrated by Dorvan Davoudi

You can contact us at the address below:

CanPrev Natural Health Products
70 North Wind Place
Toronto, Ontario, Canada
M1S 3R5

canprev.ca

t. 888 226 7733

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What's inside

A not-so-gentle wake up

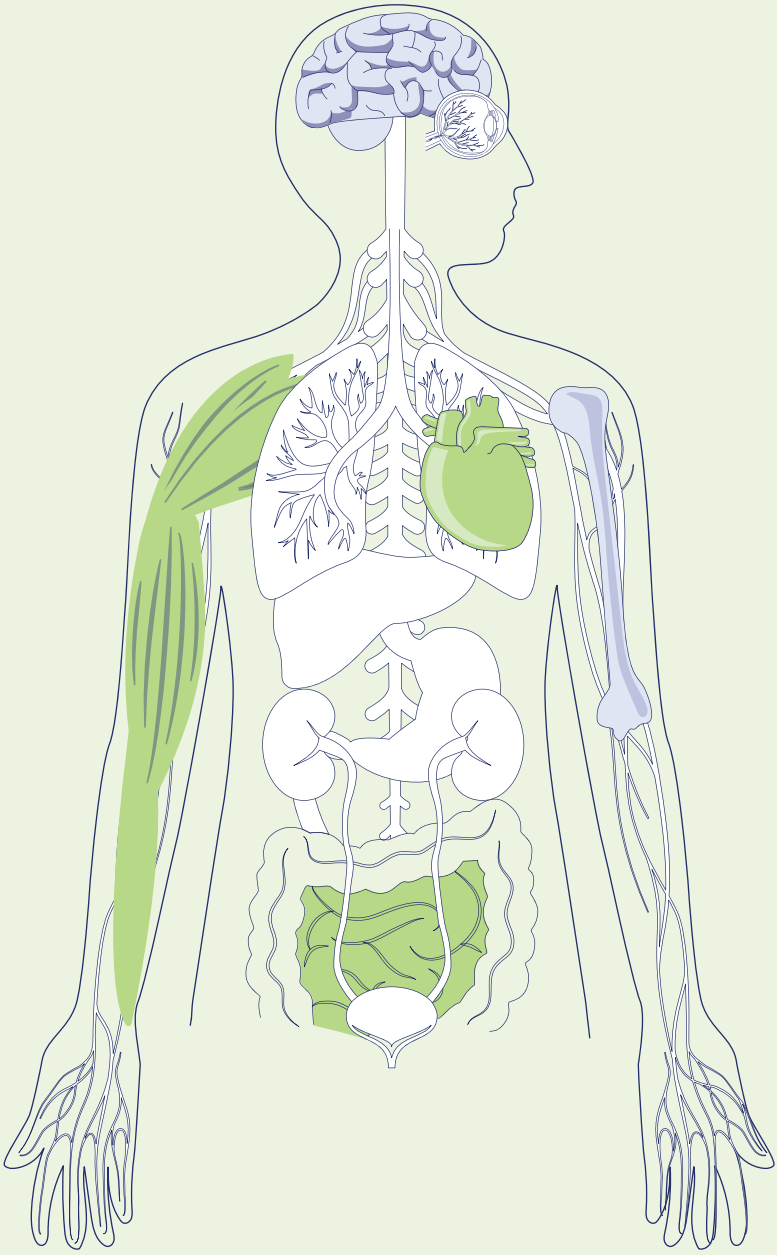
Thwack. This is the third time you hit the snooze on your alarm clock. You're running a little late for work but you can't help it. The restless sleep leaves you fatigued but you shrug it off. It's stressful but there's no time to deal with it.

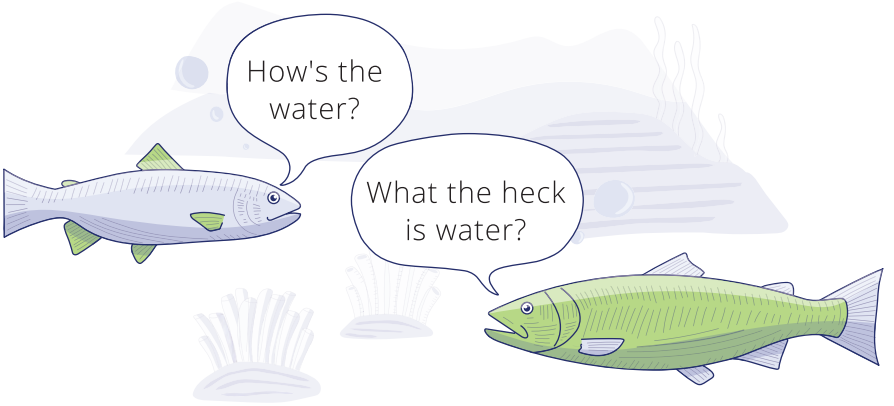
The race to the train station leaves you rather breathless and you feel your heart palpitate and legs cramp as sweat runs down the side of your face. You've already cut down the coffee, and that helped for a while, but lately, you've been feeling that throbbing again. Your muscles ache. Maybe you're just out of shape.

You look up. The sun stabs your sensitive eyes, triggering for the second time this morning, the dull reminder of a migraine.

It's easy to shrug off these symptoms as the rigours of modern living, but it could be a gentle wake up call that your body is not getting enough magnesium.

65% of magnesium is found in your bones; 30-40% in soft tissues, 1% in blood.



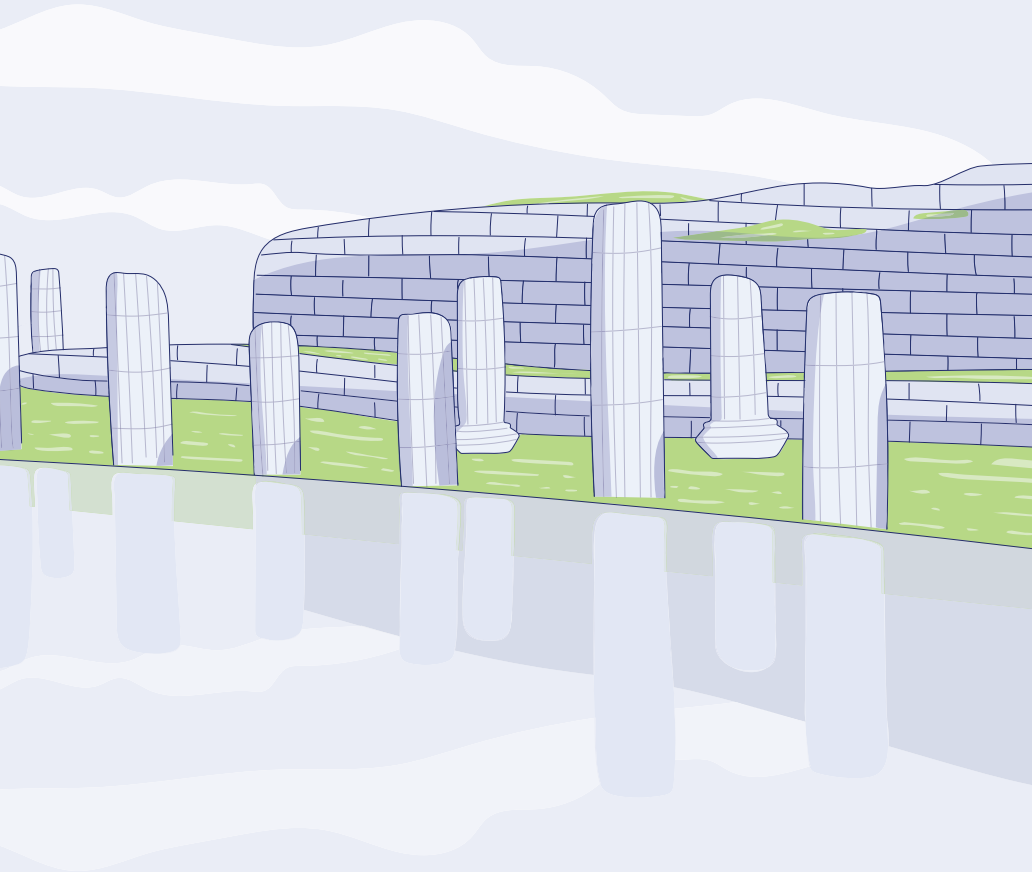


Magnesium?

Sometimes the most common things are overlooked. Although it is the eighth most abundant element in the universe and the seventh most common element in the earth's crust, we seem to have a hard time getting the magnesium we need. It's suspected that over 43% of Canadians don't get the dietary magnesium they need to stay healthy.

That's not good because it's also supposed to be the fourth most abundant mineral in our bodies.

Elemental magnesium is found in high concentrations in our bones, our heart, our muscles and throughout our network of nerves, but you can find it working away inside every cell of our bodies. Magnesium keeps heart rhythms steady, maintains muscle functions, metabolizes glucose, ensure nerves fire properly, creates cellular energy and helps to synthesize the basic building blocks of life - DNA, RNA and proteins. Over 800 different, essential biochemical roles that magnesium plays have been identified. With new research and understanding, that number is expected to rise.



Magnesium was discovered near the Greek city of Magnesia, which is known for its rich deposits of the mineral.

The first therapeutic uses of magnesium date back to the time of the ancient Greeks, in the form of baths of minerals and salts. Relaxing!

What magnesium does fundamentally

Magnesium isn't like a drug. While you might take an antacid to reduce heartburn or an antibiotic to fight infection, taking magnesium when you are deficient doesn't have just one effect. Since magnesium works on such a fundamental level, the health benefits are hard to isolate. And because we can't identify just one effect, it's easy to overlook its importance.

But it is **very** important.

This mineral isn't a drug we take only when the situation warrants. It's more like a type of fuel or building block our body uses, just as our body uses sugars, proteins and fats. Vital organs like the heart and brain simply can't function without it. Hundreds of your body's chemical processes fall apart without this mineral. When we say our whole body needs magnesium to survive, we are not exaggerating.

We're looking at magnesium the wrong way. There is a host of scientific studies linking magnesium to many different health conditions, but reviewing these effects one by one is overwhelming and confusing.

Instead, it's more helpful to look at magnesium's underlying physiological mechanisms. Understanding what magnesium does fundamentally will let us better understand how insufficient magnesium might affect our body and our daily life.

Magnesium's hundreds of roles can be roughly categorized into four basic functions.

Magnesium activates enzymes

We are kept alive by trillions of chemical reactions that occur in the body. Carbohydrates are broken up and harvested for energy. New tissue is created. Cellular waste products are removed. New strands of DNA are synthesized. This collection of chemical processes is called metabolism.

The speed a reaction occurs will depend on factors like temperature, pressure, solubility and concentration of molecules. We use these factors every day. You might notice that sugar dissolves in hot water faster, or putting food in the refrigerator will slow the rate of decay. When you make a campfire, a hotter flame will use up wood faster.

Our metabolism needs to occur at a certain speed to stay alive. But we don't have the liberty of turning the body into a raging furnace to speed up these reactions (not without damaging many things). That's where enzymes come in.

Enzymes are bits of protein that catalyze and regulate almost all metabolic reactions. As catalysts, they reduce the energy needed to spark a chemical reaction and speed up reactions. Without enzymes, reactions that would normally take milliseconds might take hours or days.

Some enzymes require additional ions or molecules called cofactors to

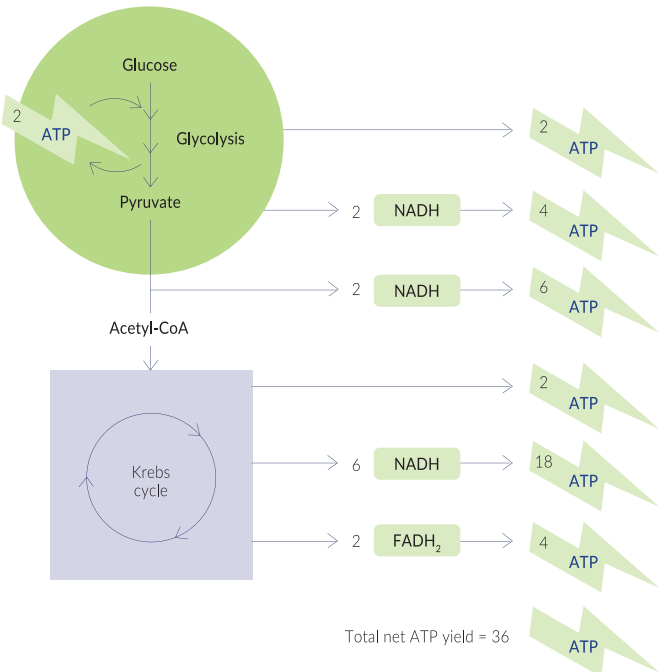
How slow are reactions without enzymes?

How long would reactions take if they proceeded spontaneously without the presence of enzymes? Dr. Richard Wolfenden, an alumni professor of biochemistry & biophysics at the University of North Carolina, posed this question. In a 1995 study, Wolfenden reported that without enzymes, the process of synthesizing DNA and RNA would take 78 million years. A subsequent study in 2008 found that producing cellular hemoglobin in the absence of enzymes would be thirty times slower, with a half-life of 2.3 billion years. That's half the age of Earth!

function. Without a cofactor bound to its structure, an enzyme may float dormant, unable to catalyze any reactions. Magnesium is a cofactor for several important enzymes in the body, like DNA/RNA polymerases, used to transcribe new DNA/RNA strands, and guanylate cyclase, used to regulate the movement of minerals across cell membranes.

A 1968 estimate suggested that magnesium was a required cofactor for 300 enzymatic reactions. This figure is found in many medical texts and quoted by many scientific papers. Since then, many more enzymes that rely on magnesium have been identified. A search of today's enzymatic databases reveals over 600 enzymes that magnesium is a cofactor for, and another 200 enzymes that need magnesium to be activated.

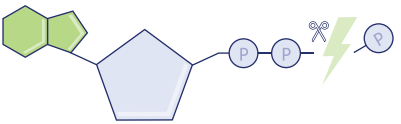
In cellular metabolism, a single glucose molecule will yield 36 units of ATP.



Magnesium creates cellular energy

Arguably the most important enzymes that magnesium is a cofactor for are the ones that produce cellular energy. These enzymes form a series of pathways (glycolysis, Kreb's cycle and phosphorylation) that convert organic compounds like glucose sugars into smaller molecules called ATP, or adenosine triphosphate. ATP acts as our main unit of cellular energy.

Every one of our hundred trillion cells manufactures ATP to store and shuttle intracellular energy. ATP stores a tremendous amount of potential energy in the bonds of the second and third phosphate groups. When the cell wants to carry out a function like cellular division or



transporting molecules across the cell membrane, it breaks this bond, releasing the energy.

We use a tremendous amount of ATP all the time. To get an idea of just how much we use, let's look at some back of the napkin calculations. (If you'd like to avoid the math, feel free to skip ahead!)

Assume a typical adult needs to eat approximately **2500 calories** of food every day. That's equivalent to consuming **10,460kJ** of energy from our food. Let's also assume all the metabolic pathways that convert food into ATP energy are about 50% efficient. So of the 10,460kJ of food energy we consume, **5230kJ** ends up as ATP. One mole of ATP releases around **50kJ** of energy in our cells, meaning the body goes through **5230/50 = 104.6 moles of ATP** every day. How much is that by weight? One mole of ATP is **507 grams. 104.6 moles x 507 grams/ mole = 53,032 grams or 53kg of ATP processed every day.**

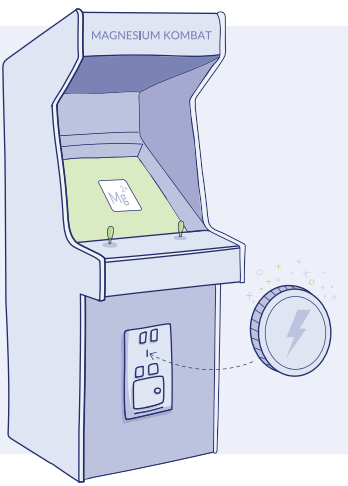
Our calculations estimate that 53kg of ATP is used every day. That's a lot of ATP, about three-quarters the body weight of your average adult human! Luckily, humans are really good at recycling and recharging spent ATP (adenosine diphosphate or ADP) through those previously mentioned metabolic pathways.

The typical adult only stores about 50g of ATP in the body so each ATP molecule is recycled over a thousand times daily!

Since these pathways are magnesium dependent, we need quite a bit of magnesium on hand to fuel a continuous production of ATP.

Insert coin to continue

If you're still confused about how ATP production works, think of a cell as an arcade. The different functions in your cell are like different arcade games you can play. To play any of these games, you need to insert a quarter. ATP is like that quarter. The cellular respiration pathways that magnesium assists kind of act like change machines, turning larger food compounds like glucose into ATP. A single glucose molecule after going through this change machine can yield up to 36 ATP.

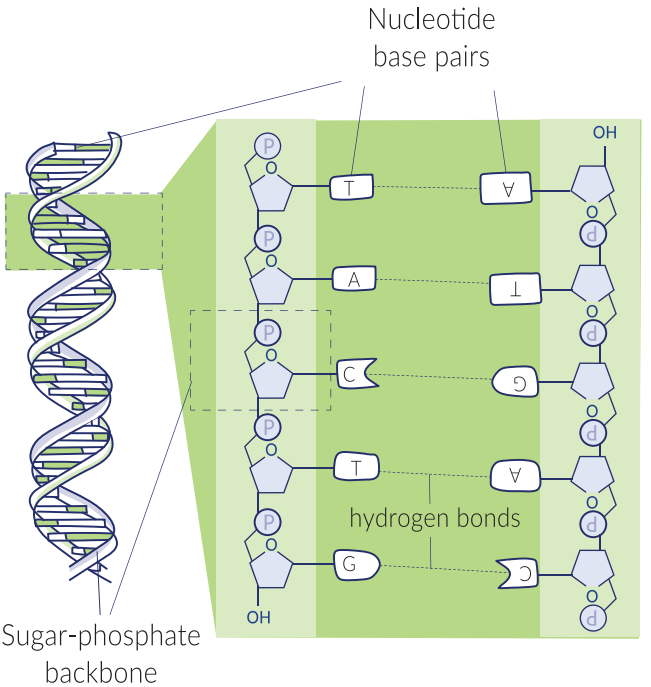


Magnesium helps to create, repair and protect DNA and proteins

For those who need a brief refresher, DNA, or deoxyribonucleic acid, is a long, twisting double-stranded molecule found in the nucleus of every cell. These nucleic acids contain the sum of genetic information that makes us unique organisms. They're also the blueprints for making all proteins in the body.

DNA strands are made of sequences of nucleotide bases: adenine, thymine, cytosine and guanine. Because of the way these nucleotides are attracted to one another, the opposite strand in a DNA molecule will have a mirror sequence of nucleotide bases. Adenine is always paired across thymine, and cytosine is always paired across guanine.

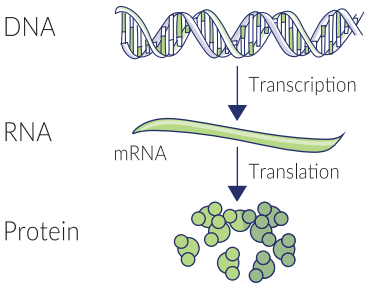
These base pairs look something like this:



Magnesium is involved in the following DNA functions.

Making proteins

When a protein needs to be created, specific DNA nucleotide sequences are read and copied (transcribed) onto another molecule called RNA. The RNA strand is then moved out of the nucleus where enzyme-like organelles called ribosomes use it as a guide to synthesize chains of amino acids that form the desired protein.



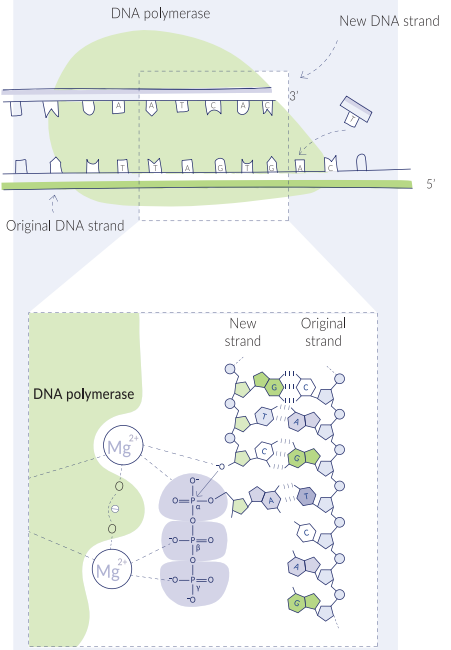
This protein synthesis relies on all sorts of enzymes to work, from helicases that open up the DNA strand to be read to RNA polymerases that create RNA-based on the original DNA sequence to protein kinases. Magnesium is a cofactor for most of these critical enzymes. The ribosome, while not technically an enzyme, is the most important catalyst for stitching together amino acids into proteins. Lots of magnesium is needed to keep this complex ribo protein stable.

Without enough magnesium, protein synthesis is impaired. And since protein is used for most of the structural components and nearly all metabolic functions in the body, a lack of proteins can have widespread consequences.

Creating DNA

We mentioned earlier that magnesium is an essential cofactor for an enzyme called DNA polymerase which repairs and replicates strands of DNA using spare nucleotides floating around in the nucleus.

After other enzymes "unzip" the double-strands of DNA, DNA polymerases attach to each strand and begin to travel down the sequence of nucleotides. As it travels, the magnesium ions bound to the enzyme help open up the nucleotide site, drawing the new, free nucleotide into position.



DNA polymerase is used all the time in DNA repair and DNA copying, creating new strands at a speedy rate of 3,000

nucleotides per minute. Consider the magnitude of the role this enzyme plays. Hundreds of billions of cell divisions occur in the body daily, and each time a cell divides, it needs to replicate an identical set of DNA, or approximately 3 billion base pairs.

DNA polymerase has two binding sites for magnesium. Without magnesium, it cannot work. This is corroborated by studies that show DNA synthesis visibly slowing in the absence of enough magnesium.

Repairing DNA

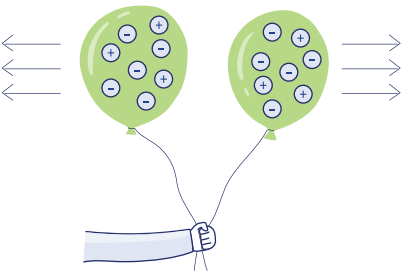
DNA polymerase is a very accurate enzyme, making less than one mistake in a billion base pairs. But even if DNA is copied perfectly, mistakes in the DNA sequences do occur. Genetic damage can occur because of thermal changes, radiation, viruses or the presence of highly reactive chemicals. There's a lot that can go wrong when you're maintaining 3 billion base pairs. If left unchecked, these mutations will be propagated with every cell division.

There is a whole other set of processes dedicated to identifying and correcting damaged DNA. The involved enzymes cut away the damaged sections and repair the gap with fresh nucleotides. Unsurprisingly, magnesium is involved in almost every enzyme in this process.

Protecting nucleotide bindings and proteins

Magnesium also has a stability effect on the structures of proteins and DNA.

You might remember that for electrical charge, opposites attract and likes repel. No? Try rubbing two balloons against your hair. Now put them side by side. Because you've given them the same electrostatic charge, they will push apart. DNA is like that too.



Each strand in a DNA double-helix is negatively charged. Without the hydrogen bonds of their nucleotide base pairs holding them together, they will repel and break apart. In situations where DNA is exposed to higher temperatures or extreme pH, these hydrogen bonds can break. Magnesium ions have a strong positive charge.

Concentrated in the nucleus of cells, these ions can help reduce the negative charges in the DNA strands, stabilizing their structure.

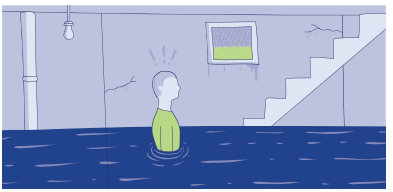
This effect has been tested experimentally - a higher concentration of magnesium will measurably raise the melting temperature of DNA molecules.

Many proteins and protein complexes incorporate magnesium into their structure - about 3751 human proteins with magnesium binding sites to date.

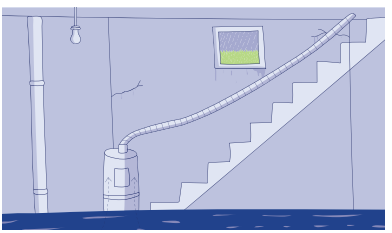
Magnesium in the cell membrane regulates concentrations of other minerals

Some of those 3751 proteins dot the surface of our cell membranes, performing a variety of roles like receiving signals from hormones (signal transduction), enzymatic activity, and transporting things across the membrane. In particular, magnesium-dependent proteins are used to facilitate the transport of different minerals into and out of cells, acting as gates for sodium (Na+), potassium (K+) and calcium (Ca+).

Many of these are active transporters, for instance pumping sodium out of cells even though it's against the concentration gradient.



Think of a flooding basement. It's raining and water naturally flows downhill. That's why it is leaking into the basement through cracks in the wall.



But if you have a water pump, you will be able to pump that water back out of the basement, against the gradient of gravity.

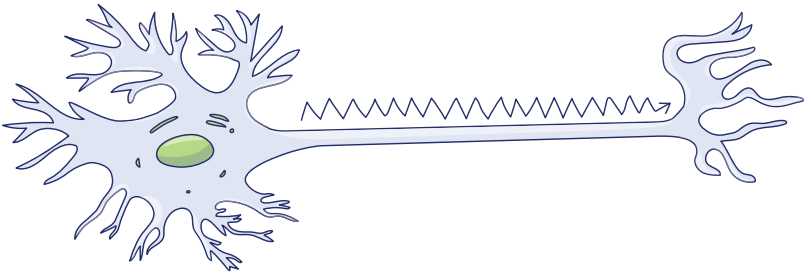
That's why we see much greater concentrations of sodium in the extracellular environment compared to the concentrations inside cells (and vice-versa for potassium). Magnesium-powered ion pumps maintain those specific concentrations. Ionic gradients serve various purposes in the body and cell. Different cellular actions are governed through varying the concentrations of these minerals.

Sodium and potassium conduct nerve signals

Sodium and potassium gradients are key to how nerve cells transmit electrical signals. When a cell receives a stimulus, the cell opens gates that allow sodium ions to rush into the cells and potassium ions to rush out. This action in one part of the cell membrane will cause nearby parts of the cell membrane to act as well, creating a travelling wave of depolarization. This wave is called the nerve impulse.

Without enough magnesium, the active transporters are unable to restore the original concentrations of sodium and potassium in the cell. This, along with a few other functions magnesium plays, can lead to an overactive nervous system which is more sensitive to random stimuli. In real life, that might translate to increased sensitivity to noise, irritability, migraines, twitching, irregular heartbeats and anxiety.

If left unchecked, a magnesium deficiency can also lead to a



potassium deficiency, as potassium is released into the bloodstream and flushed out in urine.

Magnesium regulates calcium in cells

Calcium is used in cells as a cofactor for a variety of energetic functions including nerve impulses (like sodium and potassium), cell movement and most notably muscle contractions. Because calcium is typically an excitatory cofactor, the mineral usually enters a cell only when needed for something specific, like a nervous impulse or a muscle contraction. After such an action occurs, magnesium helps active transporters pump calcium out of a cell.

Like with sodium and potassium pumps, insufficient magnesium may prevent calcium pumps from working. Unable to flush out calcium, the cell may become overstimulated, damaging the cells and even leading to cell death (apoptosis). Overexcitation in nerve or muscle cells might manifest as muscle spasms or twitching, and over time can cause neurodegenerative diseases.

Next time you are doing a high-intensity workout at the gym, see if you experience any muscle cramps. That might be an acute sign of your muscle cells not being able to restore calcium balance. Try taking magnesium and see what happens. Muscle contraction is the classic example of how magnesium and calcium balance each other in the body, and is the most easily observable.

And it's not just contractions in your biceps. Magnesium regulating calcium will affect the strength of heart and arteriole contractions too. Tension

headaches are caused by too much muscle tension or contraction in the head and neck.

Magnesium's role in our body

When we pull back from the microscope and start to sketch out magnesium's role across the body, we see that it is a staggering list. Here are just a few examples of conditions that magnesium is involved in.

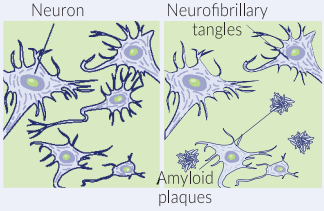
Acid reflux & heartburn

Like other muscles, the esophageal sphincter that separates the stomach from the esophagus needs magnesium to function properly. Without enough magnesium, the sphincter may spasm, allowing the acid to travel up, irritating the sensitive esophageal lining.

Attention deficit hyperactive disorder (ADHD)

Some preliminary studies link low magnesium levels with childhood ADHD. Magnesium helps reduce hyperexcitability in the central nervous system by regulating concentrations of calcium, potassium and sodium via ion channels in nerve cells. It's also a cofactor for inhibitory neurotransmitters like GABA.

Alzheimer & dementia



As mentioned before, magnesium is essential for various neuronal functions. Magnesium is a cofactor for enzymes that break down and prevent the formation of amyloid-beta plaques. These plaques, commonly associated with dementia, disrupt the neuron function. In a review of studies linking magnesium with Alzheimer's disease, those diagnosed with Alzheimer's disease showed lower magnesium levels in cerebrospinal fluid.

Anxiety, stress & panic attacks

Magnesium has several calming functions in the nervous system. It helps stabilize the membranes of nerve cells, regulates mineral concentrations used for nerve transmission through receptors like NMDA, is a cofactor for GABA, our body's primary inhibitory neurotransmitter, and promotes serotonin production. It also plays several functions in our endocrine system, through the thyroid and adrenal glands. Without these inhibitory actions, our brain cannot relax, leading to anxiety, stress or panic attacks.

Inflammation

Inflammation is the immune system's response to infection and injury. However, systemic inflammation when left unchecked can lead to many different chronic conditions, such as cardiovascular or joint problems. While the exact mechanism of action is unknown, magnesium is thought to be an anti-inflammatory agent because levels of magnesium in the body are inversely correlated to levels of inflammatory markers like CRP and IL-6.

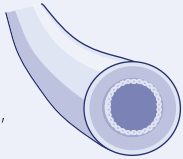
Blood clotting (intravascular thrombosis, heart attacks and strokes)

Clotting is a normal response to damage to the blood vessels. When a blood vessel wall is damaged, tiny blood cells called platelets activate. These platelets adhere to a damaged surface and release sealing agents like fibrin. Magnesium regulates the activation of these platelets (through

controlling calcium levels and maintaining cell receptors). That's why magnesium is sometimes called an anticoagulant.

Magnesium deficiencies increase the risk of unnecessary platelet activation, forming more clots in blood vessels. These clots may block blood flow to the brain or heart, increasing the risk of strokes and heart attacks.

Angina, high blood pressure & other cardiovascular conditions



Besides its role in preventing blood clots, magnesium also acts as a natural vasodilator. Magnesium, as a calcium antagonist, allows the heart muscles and the smooth muscles of the arteries to rest and relax, reducing blood pressure. If there is insufficient magnesium, these blood vessels constrict, raising blood pressure.

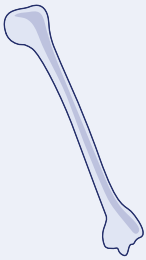
Arrhythmia / irregular heartbeat

Like elsewhere in the body, magnesium regulates concentrations of potassium and calcium in the heart. Those concentrations control and coordinate the rhythm of electrical signal and muscle contractions. Following recommendations by the Canadian Cardiovascular Society, hospitals administer magnesium intravenously to reduce the risks of atrial fibrillation and other irregular heartbeats.

Blood sugar sensitivities

Magnesium improves insulin sensitivity, allowing the body to use and store the glucose it ingests and to excrete excess glucose. A magnesium deficiency can lead to a sluggish insulin response to blood sugar, leading to insulin resistance and type-2 diabetes.

Bone & teeth building



Magnesium doesn't only regulate calcium in cells. It stimulates the production of calcitonin, the hormone responsible for inhibiting cells (osteoclasts) that break bone down, and activates alkaline phosphatase, responsible for forming new calcium crystals in bones.

Vitamin D deficiencies

If you're not seeing results from staying out in the sun or taking supplemental vitamin D, you may not have enough magnesium. Magnesium regulates key enzymes that convert the vitamin D we get from the sun and diet into the active form used by the body (1,25OHD). No matter how much vitamin D you get from the sun or from your diet, insufficient magnesium will mean insufficient vitamin D.

Calcium deficiencies

By extension, vitamin D promotes calcium absorption in the small intestine. Low vitamin D status can prevent enough calcium from being absorbed.

Potassium wasting (hypokalemia)

Magnesium is vital for the proper function of sodium-potassium pumps in the cell membranes, keeping potassium inside cells at high concentrations and potassium in the blood at low concentrations.

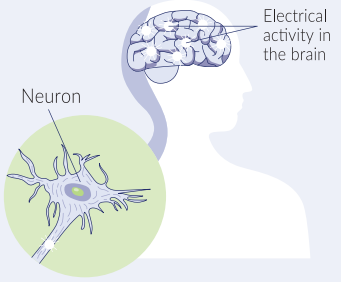
Without enough magnesium working these ionic pumps, too much potassium is released into the bloodstream where it is flushed out in urine.

Constipation

Magnesium is important for bowel peristalsis - the contraction and relaxation of intestinal muscles that move food down the intestinal tract.

Depression

In addition to regular neural activity, magnesium helps to convert tryptophan into serotonin. Serotonin is a neurotransmitter thought to maintain mood balance. Low levels of serotonin may lead to depression.



Seizures

Seizures are caused by abnormal electrical activity in the brain. Trauma, severe stress or conditions like epilepsy can cause neurons to fire excessively. Magnesium helps to stabilize cell membranes in nerve cells, preventing them from misfiring.

Sensitivity to loud noises

Insufficient magnesium to regulate calcium may cause the stapedius muscle in the ears to contract and remain tense. This tension combined with overexcited nerve firings may cause sensitivities to loud noises.

Migraines & headaches

Magnesium is linked to headaches and migraines in a few ways. Magnesium allows muscles to relax properly. Without it, muscles are prone to tense up or cramp. Muscle tension in the neck and head may cause headaches. Insufficient serotonin, which magnesium helps produce, can result in migraines, as can small blood clots reducing blood flow to the brain.

Chronic fatigue syndrome, adrenal fatigue, muscle fatigue and fibromyalgia

Considering magnesium has a calming effect on the mind, it's a little counter-intuitive that magnesium is also involved in countering fatigue. Magnesium works on multiple levels when combating low energy fatigue. Magnesium is involved in metabolizing glucose into available energy, restoring ATP to depleted muscles, and regulating stress hormones.

Muscle pain, spasms, twitches, cramps

Insufficient magnesium causes calcium to stay in muscle and nerve cells longer, causing over excitation of the muscles and nerves. This can lead to cramps, spasms, and other muscle related issues.

Insomnia

Magnesium is involved in the production of melatonin, a hormone that helps control sleep and wake cycles. Muscle tension due to lack of magnesium will also prevent good sleep.

PMS, menstrual cramps, dysmenorrhea & infertility

Magnesium aids in the manufacture of hormone proteins progesterone and estrogen. During times of elevated progesterone and estrogen, more magnesium is used, leaving a potential shortage. Insufficient magnesium may cause some of the common symptoms we see in PMS, insomnia, irritability,

cramps, bloating and tenderness - familiar symptoms!

Preeclampsia and eclampsia

Preeclampsia typically manifests as a sharp rise in blood pressure during the late stages of pregnancy. If seizures occur, then it is known as eclampsia. As with other cardiovascular conditions, magnesium is used to treat this (usually through IV) and is thought to relax the blood vessels, thus decreasing the blood pressure.

Lung function, COPD, asthma & respiratory distress

Magnesium plays a bronchodilating effect, increasing airflow to the lungs. Part of this is due to magnesium's anti-inflammatory properties, as inflamed bronchioles can prevent the exchange of oxygen to the blood. Magnesium also inhibits the release of histamines, which are known to constrict the bronchi and bronchioles.

Sports Endurance

Magnesium deficiencies can hinder endurance in sports or fitness. Muscles have limited quantities of ATP that need to be replenished during activity. Magnesium helps to recycle that ATP. Magnesium also helps with proper muscle relaxation and contraction.

Can’t get enough of a good thing

Why aren’t Canadians getting the magnesium they need to stay healthy?

It’s missing in our diets

Our diets are providing less magnesium than they used to. The composition of what we eat and the quality of our foods has drastically changed over the past hundred years, and this has made it difficult for even the most health-conscious Canadians to get enough magnesium. The Canadian Community Health Survey, conducted in 2004, showed over 34% of Canadians consuming less than the estimated average requirement of magnesium.

And those estimated average requirements are quite modest; around 350mg/day for adults. Recent estimates show that, before industrialization, dietary intakes were closer to 475-500mg/day!

Magnesium depleted soils

Food sources we’ve traditionally relied on for our magnesium, like legumes, grains and greens, are themselves deprived of magnesium! Modern farming practices, meant to increase yields and resist pests, have left overworked farmlands depleted of essential nutrients like magnesium. Soil compaction, surface irrigation, monoculture, pesticides and chemical fertilizers have all impacted the soil’s ability to restore,

A nation that destroys its soil destroys itself.

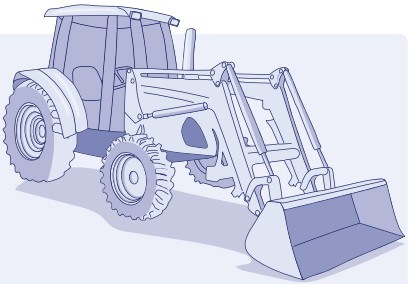
Franklin D. Roosevelt

retain and provide magnesium to crops. And while we are growing food in greater densities than ever before, they are all drawing from this same dwindling supply of magnesium.

The end result? We're overfed and undernourished. Many fruits and vegetables have lost large amounts of minerals and nutrients in the past 50 years. For example, McCance and Widdowson's epic compilation, the Composition of Foods, has tracked the nutrient composition of foods since 1940. Between 1940 and 1991, there was an average magnesium decrease of 24% in vegetables and 16% in fruits.

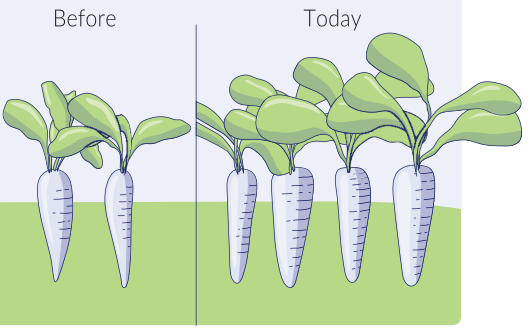
Some foods have seen more drastic declines than others. Carrots have lost 75% of their magnesium content. You would have to eat 4 carrots today to get the same magnesium in 1 carrot from 1940!

Intensive plowing eliminates protective ground cover, causing high rates of erosion. Magnesium is lost in the run-off.



Instead of traditional fertilizers made of manure and compost, today's fertilizers are synthetic. They are rich in nitrogen, potassium and phosphorus, but low on essential minerals like magnesium.

Higher yields and more crops grown in the same area of land means fewer minerals from the soil go to each plant. This is known as the dilution effect.



Food processing removes magnesium

Food processing and refining remove large swaths of magnesium. Whole grains, a staple in the modern diet, can lose over 80% of their magnesium content simply through milling. Seeds and nuts in their raw form are rich in magnesium, but the process of refining them into oils removes nearly all of their magnesium content. Even cooking vegetables can leach magnesium.

The typical Canadian diet, laced with refined grains, oils and sugars, provides large amounts of calories with little to no magnesium.

Treated water

In some parts of the world, magnesium in drinking water accounts for 50% of the recommended dietary intake. Treating and softening tap water removes minerals like magnesium before you pour yourself a single cup!

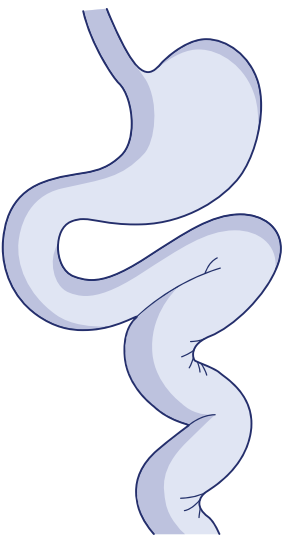
It's getting harder to absorb

Regardless of how much you consume, you will not get enough magnesium without good absorption. Foods containing magnesium need to be digested, broken down by enzymes and acids in our digestive tract, before they can be absorbed in the small intestine. A breakdown in the digestive process will seriously impede how much magnesium can be absorbed.

Weaker stomach acid

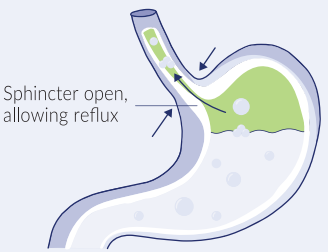
Magnesium needs to be soluble to be absorbed by the small intestine. The strong gastric acid in the stomach provides an environment that dissolves magnesium into this soluble form. If the environment is not acidic enough, magnesium will remain insoluble and will simply be flushed through the intestinal tract.

While age is the primary culprit for low stomach acid, chronic stress that is so common in modern life will also reduce acid production. The stress response diverts energy away from tasks like digestion. Overuse of antacids to reduce common symptoms like heartburn is another contributor.



Gastrointestinal conditions

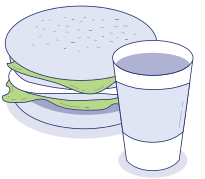
Chronic functional disorders of the gastrointestinal system are becoming increasingly common. Inflammatory bowel diseases like Crohn's and colitis result in inflammation in the intestine. The inflammation destroys intestinal mucosal cells, which impedes the absorption of key nutrients like magnesium. Other conditions such as irritable bowel syndrome (IBS) and yeast overgrowth can have similar effects in inhibiting magnesium absorption or flushing it out (through diarrhea) before it can be absorbed.



Hold off on that antacid.

Contrary to common belief, acid reflux or heartburn is not a symptom of too much acid in the stomach but too little. Low stomach acid can contribute to malabsorption of carbohydrates, which in turn leads to a build-up of gasses in the stomach. This intra-abdominal pressure pushes the stomach contents, including gastric acid, up to the esophagus where it can irritate the sensitive lining. Taking an antacid can provide temporary relief, but it will decrease an already low amount of stomach acid, making the issue worse, not to mention making it harder for us to breakdown magnesium!

Foods, drugs and other substances that block absorption



If you enjoy drinking soda, you may want to find a new drink.

Some foods are not only lacking in magnesium, but can also block its absorption. For example, the phosphoric acid in many popular sodas will impair absorption by forming phosphates with magnesium ions in the digestive tract. These phosphates are insoluble and cannot be absorbed through the intestinal walls. Phytic acid, found in soybeans, the hulls of seeds or bran of grains can also form insoluble compounds. Oxalic acids in raw greens and tannins in teas do the same.

Other minerals such as calcium or iron are absorbed in the intestine the same way as magnesium. When you consume minerals together, they often compete for the same limited channels of absorption. This is the reason why practitioners recommend taking mineral supplements at different times.

It's not limited to foods. Many drugs also bind to magnesium ions, making them insoluble. Tetracycline antibiotics, corticosteroids and diuretics are just a few examples. Even tap water, if treated with fluorine, can inhibit magnesium absorption. Fluoride binds with magnesium to form an insoluble crystalline compound that the body can't absorb.

Easier to lose

Our magnesium requirements have increased.

We've established that magnesium is involved in many processes throughout the body. Overstimulating these processes will result in an increase in our magnesium requirements. For instance, when we suffer from high stress, our body produces a hormone protein called cortisol. Producing and regulating this hormone means spending and excreting more magnesium.

Magnesium is fundamental to proper metabolism. Modern diets high in refined sugar cause more magnesium to be used in both metabolizing glucose into cellular energy, as well as activating the release of insulin. That's why inadequate magnesium can lead to elevated insulin and glucose levels in the blood, and therefore insulin resistance. This can lead to the flushing of excess glucose in urine, which has the unfortunate side effect of flushing serum magnesium along with it.

Coffee, alcohol, diuretic drugs and birth control pills can cause our kidneys to eliminate more magnesium than they should.

Drug-Induced Nutrient Depletion

Despite being effective and even life-saving, both over-the-counter and prescription medications can have potential side effects. What most people don't realize is that the side effects may not come from the drug itself, but rather as a result of nutritional deficiencies from prolonged use. Medications can deplete nutrients (like magnesium) through various mechanisms, like altering the way a nutrient is absorbed, converted, stored or excreted.

Some, like acid blockers, can impair the digestion of nutrients. Others may bind with nutrients, preventing absorption completely. Others, like diuretics, can increase urine output, causing a loss of water soluble vitamins and electrolytes such as potassium and magnesium.

Most at risk? Seniors.

The Canadian Institute for Health Information (CIHI) reported in 2009 that about two-thirds (63 percent) of seniors on public drug programs in six provinces were claiming the use of five or more drugs from different drug classes. Nearly a quarter (23 percent) had claims for 10 or more drug classes.

Polypharmacy, the use of five or more prescription medications, is common among seniors. It's further compounded by the fact that seniors metabolize and eliminate drugs more slowly due to aging kidneys and liver.

Some drugs that affect magnesium levels*

Antacids - Calcium carbonate and sodium bicarbonate

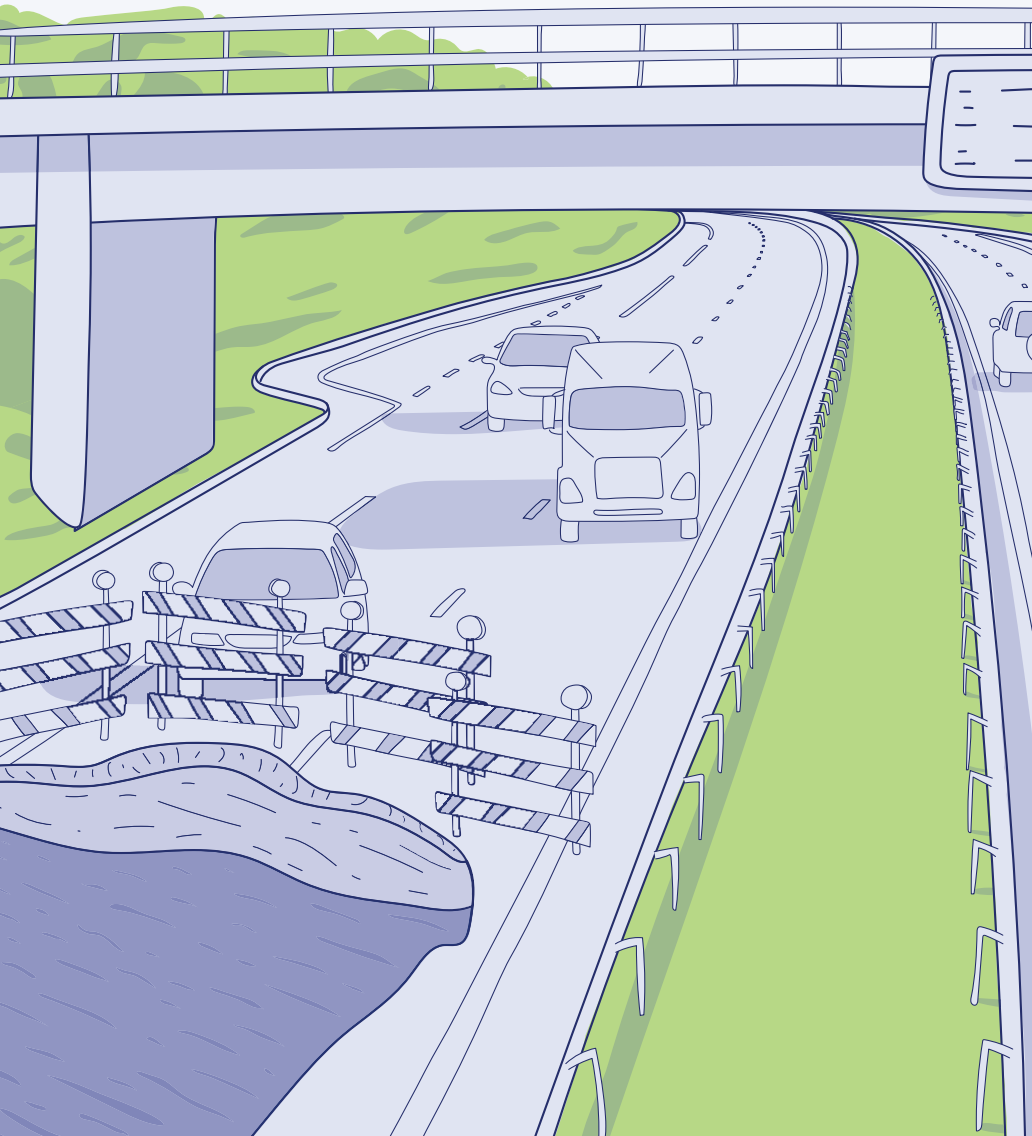
Acid blockers - Ranitidine, Cimetidine, Nizatidine, Famotidine

Antibiotics - Tetracycline, Amoxicillin, Doxycycline, Cephalexin

Anti-Hypertensives - Thiazide diuretics, Loop diuretics, Hydralazine

Cardiac glycosides like Digoxin

*This list is by no means conclusive, but meant to give you an idea of which medication classes to watch out for.



What does a magnesium deficiency look like?

Without enough magnesium, your body will have huge disruptions in the most fundamental processes of life. Not enough cellular energy. Not enough proteins synthesized. All kinds of metabolic reactions interrupted. It's hard to tell how which disruptions will rear their ugly heads. Migraines, high blood pressure, heart palpitations, anxiety, infertility, or more muscle cramping.

You might experience one, two, or several symptoms all at once. You may show no signs at all until much later. Or it might trigger a cluster of abnormal biochemical conditions that will increase your risk of other secondary problems.

Imagine commuting on a busy highway. To keep it in good shape, the highway needs to be a regularly maintained. Roads need to be graded. Ruts filled in. And it wouldn't hurt to pave a fresh coat of asphalt after the cold winter. Say the government didn't have the funds and had to reduce its maintenance schedule. Your drive to work may not feel different for a few months, or even a few years.

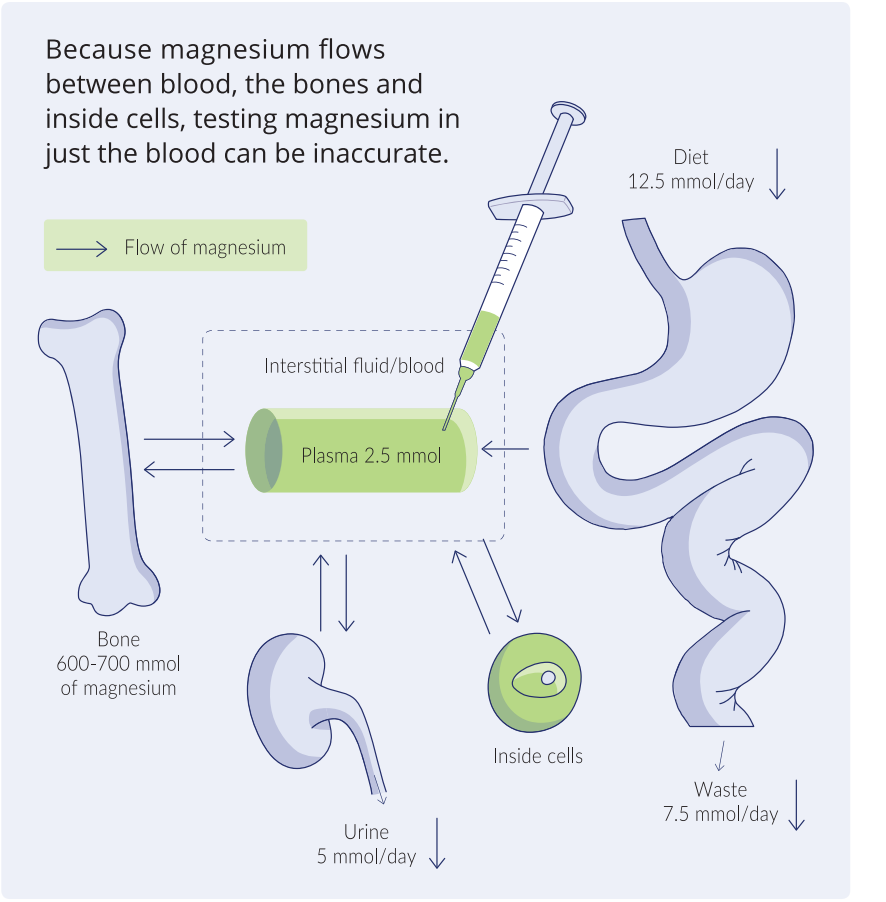
Then one day you'll drive through a really big pothole! Bam. Where did that pothole come from? What caused it? Clearly, the reduced roadwork was partly responsible but it's pretty hard to pinpoint the precise cause.

Can I test for magnesium deficiency?

We love tests and recommend that you always review your blood and urine test results closely with your healthcare practitioner.

But when it comes to testing your magnesium level, it's a little complicated. Magnesium is kept mostly in bones and in soft tissues. The amount that travels through our bloodstream is less than 1%, and those levels are tightly regulated by your body.

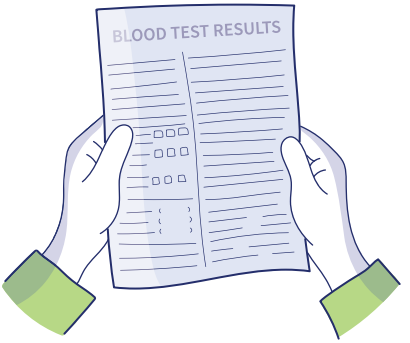
Magnesium levels in blood or urine might not relate to magnesium



levels in the body as a whole. There are a few other tests that are more accurate (for example testing magnesium inside red blood cells), but we recommend, as a first defence, to become familiar with magnesium deficiency symptoms and risk factors.

If you decide to requisition a magnesium red blood cell test, try taking one baseline test before supplementing with magnesium and again three to four months after supplementation. Steady, consistent supplementation will help build up the reserve stores in your bones and tissues. Repeating this test every three to four months will provide a guide for how much magnesium you should be supplementing.

One last thing. If you take the RBC test, the reference range you might see is between 1.65 and 2.52 mmol/L. That's a very wide interval and you may still experience deficiency symptoms at the lower end of this range.



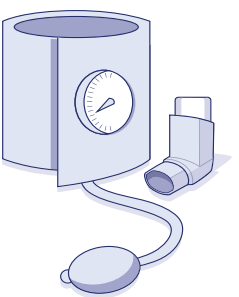
When supplementing, you'll want to aim for a test result in the higher end of the range, say around 2.4 to 2.52mmol/L.

What are the signs of a deficiency?

A sign or symptom on its own can easily be mistaken for another condition, but when reported together, can provide you a better confidence that you may not have enough magnesium. Understanding the mechanisms of magnesium in the body can help you understand why you might experience symptoms too.

Am I at a higher risk for magnesium deficiency?

Certain conditions can upset your body's magnesium status. Gastrointestinal diseases like IBS or colitis may disrupt your gut's ability to absorb dietary magnesium. Hyperthyroidism, intense athletic activity or chronic stress may increase the demand for magnesium as your body metabolizes faster or creates more hormones like cortisol. Conditions like type II diabetes may increase the amount of magnesium excreted through the kidneys.



Magnesium Status Checklist

To help you figure whether you might not have enough magnesium, we've created a checklist of symptoms and risk factors. Tick off the corresponding box for any statements that apply to you. Check this list again every four months or so to see whether supplementation has improved your conditions. (Did we mention that we love testing?)

	Baseline	month 4	month 8	month 12
Risk Factors: Diet and Lifestyle				
Drinking more than 3 cups of coffee or tea per day				
Drinking over 7 alcoholic drinks per week				
Eating junk foods with high sugar, fats or salt				
Consuming less than one serving of greens per day				
Limited consumption of seeds, nuts or fruits				
Intense exercise or training more than 3 times per week				
Excessive sweating				
Currently pregnant or have been pregnant in the past 12 months				
Risk Factors: Conditions				
Regularly having undigested foods in stools				
Chronic kidney disease				
Diarrhea				
Heavy menstrual periods				
Risk Factors: Supplements & Drugs				
If you are taking...				
Acid blockers				
Antacids				
Antibiotics				
Antihypertensives				
Calcium or iron supplements				

	Baseline	month 4	month 8	month 12
Corticosteroids or anti-inflammatories				
Diuretics				
Hormone replacements				
Oral contraceptives (birth control)				
Vitamin D				
Signs & Symptoms				
Chronic fatigue, lethargy or low energy				
Chronic headaches or migraines				
High blood pressure				
Rapid or irregular heart rate				
Anxiety or panic attacks				
Hyperventilation or frequent sighing				
Nausea or vomiting				
Lack of appetite				
Confusion or difficulty concentrating				
Poor memory or confusion				
Mood swings				
Feeling irritable				
Muscle cramps or spasms				
Hand tremors				
Muscle weakness or soreness				
Muscle, neck or back pain				
Twitching, tics, or restlessness				
Restless leg syndrome				
Reynaud's syndrome				
Fibromyalgia				
Shortness of breath				

	Baseline	month 4	month 8	month 12
Chest tightness				
Startled easily				
Sensitivity to loud noises or lights				
Tingling or other unusual sensations in the hands or feet				
Poor circulation leading to cold hands and feet				
Osteoporosis or low bone density				
Irregular periods				
Preeclampsia and eclampsia				
Severe PMS				
Difficulties conceiving				
Loss of libido				
Hyper or hypothyroidism				
Hyperparathyroidism				
Trouble sleeping				
History of seizures				
History of strokes				
Low blood potassium				
Vitamin D deficiency				
Strong cravings for carbohydrates, salt or chocolate				

If you decide to take a red blood cell test for magnesium, you can enter the results here. You are aiming for a result between 2.4 to 2.52 mmol/L

	Date of test	Result (mmol/L)
Baseline		
Month 4		
Month 8		
Month 12		

What if don't I see any symptoms? Silent deficiencies & triage theory.

Sometimes, micronutrient deficiencies may not exhibit the usual array of signs and symptoms. Why does this happen?

Dr. Bruce Ames is a professor emeritus of molecular biology at the University of California Berkeley and a senior scientist at the Children's Hospital Oakland Research Institute. In his research on degenerative diseases, he noted that deficiencies in various micronutrients may lead to DNA damage and cellular aging. He theorized that this was the consequence of something called triage allocation.

Organisms (like humans) commonly live through episodes of micronutrient shortages. Triage allocation theory hypothesizes that during those shortages, scarcer micronutrients are allocated towards urgent short-term survival at the expense of sustaining long-term health. For example, in a vitamin K shortage, the body will allocate what little it has to fuel critical metabolism in the liver at the expense of the vitamin's bone-building function. A shortage of iron will draw from stores in the liver before it draws from iron stores in the heart.

Triage allocation theory can help explain why moderate shortages of minerals and vitamins might increase the risk of chronic diseases but have no overt symptoms of a deficiency. It can also explain why someone might not be getting enough magnesium despite lacking the classic signs of deficiency, like cramps, tics, seizures or irregular heart beats.

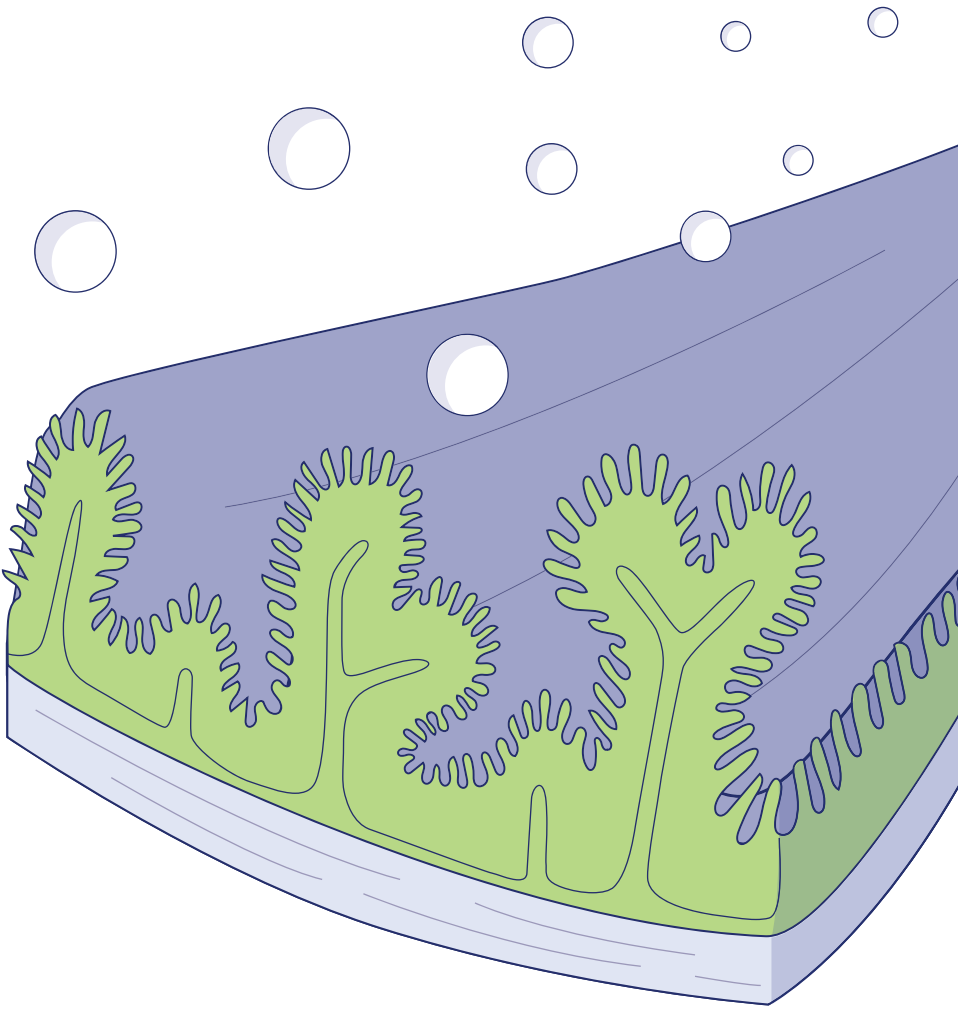
Triage theory: Rebalancing micro-nutrients for short-term survival at the expense of long-term health.

Can I have too much magnesium?

The body is highly competent at regulating magnesium levels. If too much dietary magnesium is consumed, it can flush the excess through the digestive tract as diarrhea. Too much magnesium in the bloodstream is flushed out through the kidneys in urine. As long as these safety mechanisms are functioning, it is very difficult to take too much magnesium. The worst you may experience is loose stools.

If these safety mechanisms are not functioning, then you should consult your healthcare practitioner prior to oral magnesium supplementation. In particular, if you suffer from kidney (renal) failure or bowel obstructions, you will not be able to clear magnesium from the body.

You should also consult a healthcare practitioner if you have any conditions that involve too much muscle relaxation such as very low blood pressure or irregular heartbeat.



A gentle introduction to magnesium absorption

The magnesium we take is never pure magnesium. Magnesium ions (Mg^{2+}) are highly reactive and unstable on their own. They are positively charged ions and like to form compounds with other substances. When they bind with negatively charged molecules (anions) they form salts. When they bind specifically with amino acids, we call them amino acid complexes.

How we absorb salts and complexes are slightly different. We'll show you how that works.

Absorbing magnesium salts

Before magnesium from salts can be absorbed, they must first be dissolved back into ionic forms. The strong acids of the stomach break apart the bonds that hold magnesium to the other molecules. In this soluble, fluid state, the free magnesium ions travel down to the duodenum where they are absorbed through small mineral ion channels found along your intestinal wall.

Pretty straightforward so far, but magnesium ions encounter a few challenges. The ion channels are small and can only transport magnesium ions when they are unattached to other molecules.

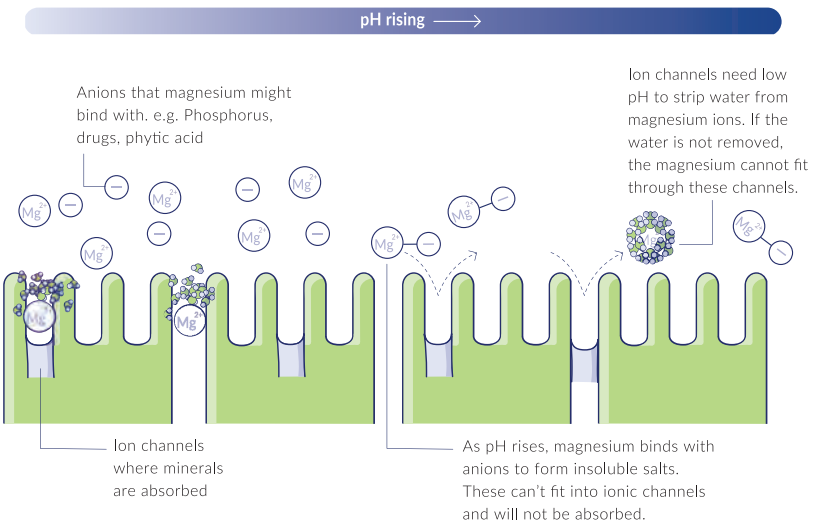
That's easy to ensure in the gastric acid of your stomach - acidic environments are good at breaking the bonds between magnesium and other molecules. But the further away you travel from the stomach, the less acidic the environment becomes. The less acidic the environment, the harder it is for magnesium ions to remain soluble.

What happens when the pH levels rise? Magnesium ions start to bind with other nearby substances, usually forming insoluble compounds. These insoluble compounds precipitate out of the liquid and pass through your body as waste!

Think about the calcium deposits that sometimes clog your showerhead. There is always a certain level of calcium ions that are in the water. At cool temperatures, this isn't a problem. Calcium ions will remain dissolved in water.

$$Ca^{2+}_{(aq)} + CO_3{}^{2-}_{(aq)} \leftrightarrow CaCO_{3(s)}$$

But we like hot showers. As the water heats up, calcium begins to bind with carbonate ions also dissolved in the water. This forms insoluble calcium carbonate which



Quick tip: Calcium, like magnesium, is also pH soluble. You can battle mineral deposits by soaking your showerhead in some vinegar or lemon juice.

precipitates out of the water and forms solid deposits on the inside of your showerhead.

The shell of water

There's another challenge. Even if a magnesium ion remains dissolved, its positive electrical charge will tend to attract water molecules. A shell of water (a hydration shell) will start to form around magnesium, making it rather large. The hydrated radius is about 400 times larger than the radius of a bare magnesium atom.

A sizeable challenge for absorption but not insurmountable. The proteins that make up the ion channels are capable of removing enough water for the magnesium ion to pass through to the far side.

The caveat? These proteins need a certain acidic pH to function properly.

Low pH is needed

Magnesium salts are a good source of magnesium provided you can keep your pH low enough.

Absorbing amino acid complexes

Magnesium amino acid complexes (or chelates) behave differently from magnesium salts. The strong and stable bonds between magnesium and the amino acids keep the whole molecule intact in acidic environments.

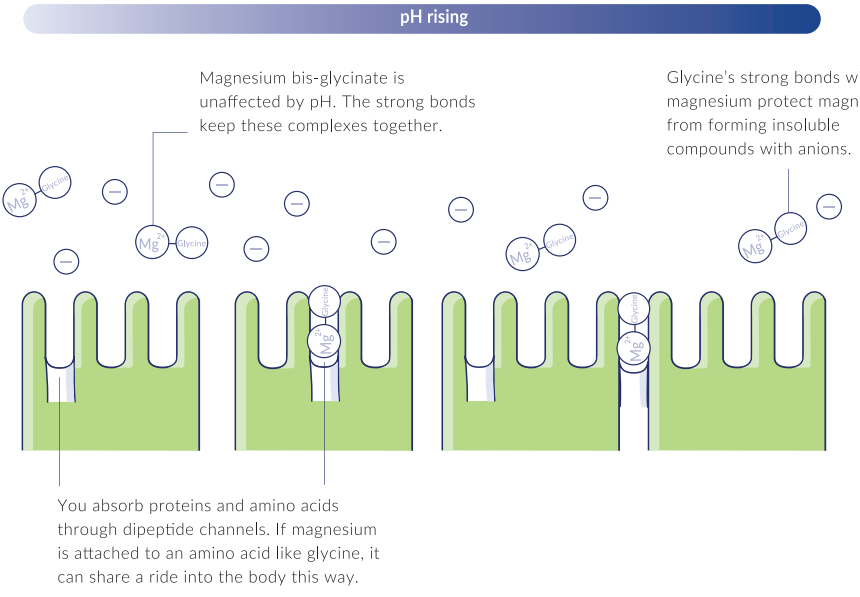
When complexes travel through the intestinal tract, they bypass the ion channels. Instead, they use other transport sites called dipeptide channels. Here, the amino acid and magnesium are carried across the intestinal membrane together.

There are a few key advantages to this. For one, there are far more dipeptide channels than there are ion channels in the gut. Magnesium complexes do not compete for the same ion channels used by other minerals.

Another advantage is that the stable bonds protect magnesium from unfavourable chemical reactions that might lead to the creation of unabsorbable precipitates.

Mineral amino acid complexes are actually quite common in nature and a natural way we get magnesium from our diet. Some of this magnesium is already bound to amino acids, but even when we consume magnesium from salts, amino acids can help!

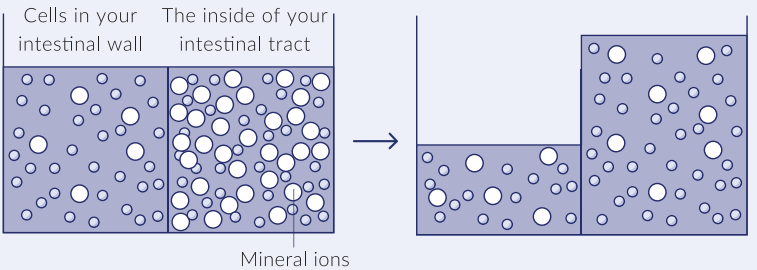
Peptides and amino acids can bind to magnesium ions and form complexes right in your body.



Why does magnesium sometimes cause diarrhea and digestive upset?

It's all about osmosis. When there are more mineral ions unabsorbed in the intestinal tract than there are mineral ions in the surrounding intestinal cell wall, osmosis tries to equalize the concentration of ions.

This means water flows out of the mucosa cells into the intestine. Too much water in the intestinal tract could mean loose stools, bloating and diarrhea. That's why having too much unabsorbed magnesium in your gut can have this laxative effect! Yuck!



Solvents like water will move across a membrane to equalize any difference in the mineral concentrations. Water will move to dilute the higher concentration.

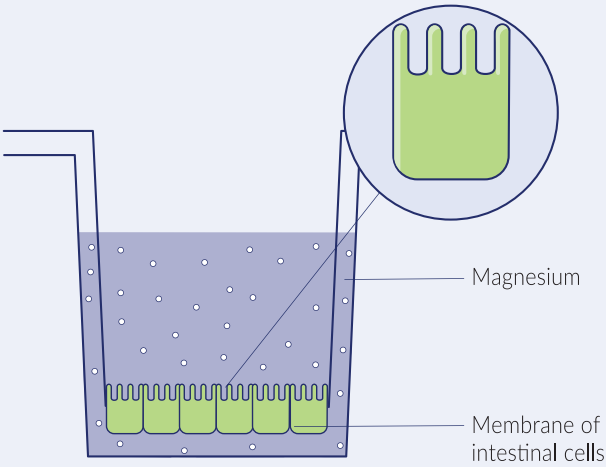
Experiments in magnesium absorption: which magnesium should I take?

Studying the bioavailability of magnesium is complicated. Unlike pharmaceutical drugs that can be detected chemically in the body, magnesium is found everywhere in the body in high concentrations. Direct measurement is also complicated. Our blood contains less than 1% of our total magnesium levels, is tightly regulated, and changes by up to 6% depending on the time of day. Even if we test for magnesium in blood serum, we're also unsure how magnesium levels in the blood relate to magnesium levels in bones or in soft tissues.

All these things make it difficult to clinically determine how much magnesium is retained by the body through measuring blood or urine.

However, we can reliably investigate how well different magnesium types are absorbed through the intestinal walls.

Many pharmaceutical scientists study the absorption of drugs by cultivating intestinal cells into a thin membrane layer that has all the features of a real intestinal wall, including various nutrient transport channels and a brush border. This layer of cells is placed into special plates called transwells. From these, scientists can measure how much of an agent permeates through this semipermeable layer to the other side.



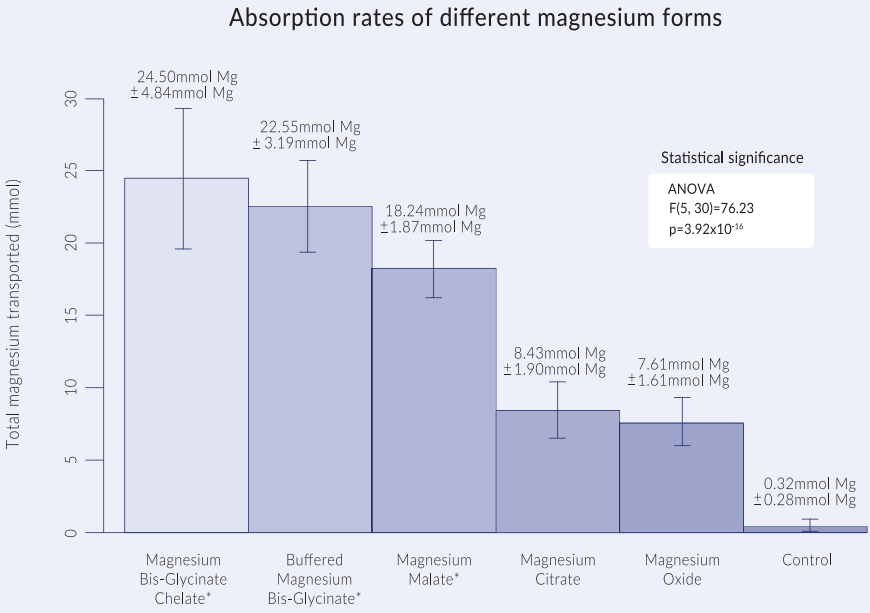
Transwells have two compartments separated by a thin membrane of cultivated intestinal cells. Researchers place different magnesium solutions into the inner compartment and measure how much magnesium passes through the membrane into the outer compartment.

Scientists studying magnesium absorption have also used this method to predict how well different kinds of magnesium can pass through our intestinal lining. First, different kinds of magnesium are added to a solution that mimics the pH of the digestive tract. They are placed into the upper compartment of these plates. Some of the magnesium will transport through this membrane layer into the bottom compartment. The bottom compartments are then measured for magnesium levels using a mass spectrometer.

These are fast and repeatable experiments that help us build a model for understanding how magnesium is absorbed in the body.

So what are the results? A 2016 study using the above methodology resulted in the following.

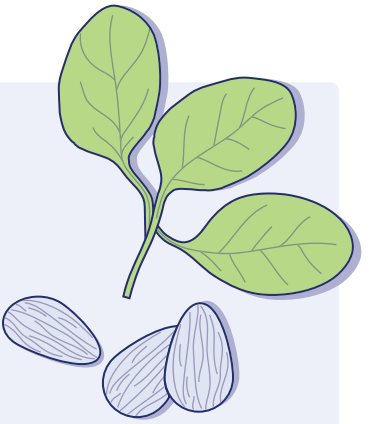
The chelated magnesium bis-glycinate and buffered magnesium bis-glycinate (the same materials we use) were much better absorbed than other forms like magnesium citrate and magnesium oxide on its own.



*These source materials were provided by Albion Minerals, the same ingredients found in CanPrev Magnesium.

Source: Hartle JW, Morgan S, Poulsen T. Development of a Model for In-Vitro Comparative Absorption of Magnesium from Five Magnesium Sources Commonly Used as Dietary Supplements. The FASEB Journal. 2016 Apr 1;30(1 Supplement):128-6.

What should I do if I'm deficient?



Correcting your magnesium status requires some effort, especially when levels of magnesium in foods are in decline. However, looking at the checklist you filled out earlier, there are some risk factors you can deal with right away.

Lifestyle & Dietary Recommendations

- Cut back on the consumption of coffee, alcohol and soft drinks. These drinks can increase magnesium wastage and reduce magnesium absorption.
- Cut back on processed and junk foods. Heavy processing will remove many minerals found in food.
- Reduce sodium consumption. Sodium competes with magnesium for ion channels.
- Soak beans and grains before cooking. Soaking can reduce phytic acid found in high concentrations in beans and grains. Phytic acid interferes with magnesium absorption in the gut.
- Steam raw greens like spinach and chard to remove the oxalic acid content. Oxalic acid also interferes with magnesium absorption.
- Try to remove stressors in your life. Easier said than done, but dealing with the root causes of stress and anxiety will help improve magnesium digestion (IBS is often stress-induced) and reduce magnesium wastage. You can measure levels of the stress hormone cortisol through a non-invasive saliva test.
- Increase your consumption of organic greens. Look for dietary greens that use organic, natural fertilizer. Artificial fertilizers are rich in nitrogen, potassium and phosphorus, but usually poor in magnesium. Joining a community-sponsored agriculture is a great way to access locally grown greens.
- Add more raw nuts and seeds into your diet. Nuts and seeds can be eaten raw, have low phytic acid compared to other plant-based foods, and are easy to snack on.

Taking an oral magnesium supplement consistently is an easy way to improve your magnesium levels.

Once you've started making these changes, go through the checklist again (and perhaps do another RBC magnesium test) to verify improvements.


CanPrev™
Magnesium
Bis·Glycinate 200
Gentle
200mg of Pure Elemental
Magnesium per Capsule
PRO ESSENTIALS
NPN 80015411 120 VEGETABLE CAPSULES VÉGÉTALES
PREMIUM NATURAL HEALTH PRODUCTS

CanPrev Magnesium: Designed to deliver more

When designing our line of magnesium supplements, we knew that simply providing more magnesium wasn't enough. We wanted to create a magnesium that works for everyone.

One that can provide more magnesium, yes, but also one that is eminently absorbable and remarkably gentle.

One that would work in the face of today's challenges. Not enough magnesium in our diet. The drugs and chemicals that block the essential mechanisms of absorption. And the stress that depletes our stores faster than before.

Good product design takes all of these challenges into account. We think we've done that with magnesium, creating the perfect balance of magnesium and glycine to suit everyone's individual needs.

Which optimized magnesium bis-glycinate is right for me?

Effective supplementing of magnesium depends on two factors: how much you consume and how much your body can absorb. How much you can absorb depends on your lifestyle, your diet, stress levels, medications you may be taking and age.

For most individuals, the 200 will provide an effective dose that is gentle and absorbable. For individuals who are chronically stressed, older, or may be taking prescription medications, the 140 or 80 will provide better absorption.

Perfect magnesium guarantee.

If the CanPrev optimized magnesium bis-glycinate product you purchased isn't right for you, let us know. We'll help you figure out the right one for your need and exchange it for another magnesium bis-glycinate.

Picking the right magnesium for your individual need is important to us.

Magnesium Bis-Glycinate 200 **Gentle**

This unique magnesium-glycine complex provides a therapeutic 200mg of pure, elemental magnesium with every vegetable capsule. A fair balance of potency, gentleness and absorption, this Magnesium Bis-Glycinate is great for most cases.

Magnesium specifications

200mg of elemental magnesium
Magnesium bis-glycinate blend (magnesium oxide, magnesium bis-glycinate chelate, glycine)

Ideal for

Most people!

Active lifestyles

Available formats

120 & 240 vegetable capsules
120g powder

Magnesium Bis-Glycinate 140 **Extra Gentle**

Designed for those seeking potency with enhanced gentleness, this Magnesium Bis-Glycinate delivers more glycine to ensure magnesium absorption in spite of digestive issues. Recommended for those with sensitive digestion, IBS or weak stomach acid.

140mg of elemental magnesium
TRAACS® magnesium bis-glycinate chelate buffered (magnesium bis-glycinate chelate, magnesium oxide)[1]

Sensitive stomachs

55 years or older

120 & 240 vegetable capsules

Magnesium Bis-Glycinate 80 **Ultra Gentle**

Designed for those seeking magnesium with maximum gentleness. This form provides the most glycine to ensure gentle absorption and resistance to insoluble substances. Recommended for those with multiple prescriptions or digestive conditions like Crohn's and colitis.

80mg of elemental magnesium
TRAACS® magnesium bis-glycinate chelate[1]

Digestive issues

If taking medications

120 & 240 vegetable capsules

1. Mineral chelate supplied by Albion Laboratories, Inc. TRAACS® and the Albion Gold Medallion design are registered trademarks of Albion Laboratories, Inc. Chelate covered by U.S. Patent 7,838,042.

GOAL-SPECIFIC MAGNESIUM

Magnesium + GABA & Melatonin for Sleep

Augmenting our Extra Gentle magnesium form with melatonin and GABA, this formulation is designed to help people relax, reset their circadian biological clocks, get better sleep.

Magnesium specifications

125mg of elemental magnesium
TRAACS® magnesium bis-glycinate chelate buffered (magnesium bis-glycinate chelate, magnesium oxide)[1]

Supporting ingredients

100mg of GABA
Gamma-aminobutyric acid

2.5mg of Melatonin

Ideal for

Light sleepers[2]

Jet lag[2]

Available formats

120 vegetable capsules

Magnesium + Taurine, B6 & Zinc for Cardio

Extra Gentle magnesium combined with therapeutic levels of taurine, vitamin B6 & zinc, this formulation was designed for those seeking stronger cardiovascular support in their magnesium.

Magnesium specifications

75mg of elemental magnesium
TRAACS® magnesium bis-glycinate chelate buffered (magnesium bis-glycinate chelate, magnesium oxide)[1]

Supporting ingredients

550mg of Taurine

25mg of B6 pyridoxal-5-phosphate

2.5mg of Zinc as TRAACS® zinc bisglycinate chelate

Ideal for

Cardiovascular function[2]

Proper heart muscle function[2]

Available formats

120 vegetable capsules

Magnesium Malate

This magnesium form is often recommended by naturopathic doctors for improved metabolic + energetic function.

110mg of elemental magnesium
Albion® Di-Magnesium Malate[1]

ElectroMag™ Effervescent Drink Mix

ElectroMag delivers a shocking 150mg of elemental magnesium with vitamin C and electrolytes, all in a refreshing effervescent drink. It's an ideal form factor whether you're training for a triathalon or enjoying an active life.

150mg of elemental magnesium

375mg of Vitamin C
ascorbic acid

If feeling chronically fatigued[2]

Aching muscles or inflammation[2]

Being active or on the go

Endurance athletes

120 vegetable capsules

30 packets

2. These are not health claims, but are considerations to discuss with your healthcare practitioner. Magnesium is a factor in the maintenance of good health.

Frequently Asked Questions

What do the 200, 140 & 80 numbers on your labels mean?

Those numbers refer to the amount of elemental magnesium in each capsule. For example, our **Magnesium Bis-Glycinate 200 Gentle** contains 200mg of elemental magnesium per capsule.

What do you mean by "pure"?

A pure product means that there are no flavours, fillers or impurities.

Do you add anything else to your magnesium bis-glycinate capsules?

Every capsule is packed with magnesium material. Even if we wanted to, there wouldn't be enough room! The only thing we add is a minute amount of vegetable-grade magnesium stearate to help produce a consistent, uniformly-filled capsule. Nothing else!

What's the difference between magnesium bis-glycinate and magnesium glycinate?

Conventionally, they mean the same thing. The terms are used interchangeably.

Blended, buffered, chelated - what do these mean?

There are three forms of magnesium bis-glycinate: blends, buffered chelates and chelates. Magnesium bis-glycinate **chelates** (also known as 'fully reacted' or 'fully chelated' forms) bind magnesium ions to glycine molecules directly through a patented manufacturing process.

Magnesium bis-glycinate **blends** deliver more elemental magnesium through a process of dry-blending magnesium oxide, chelates and glycine. **Buffered chelates** combine chelates with added magnesium oxide into a homogenized form.

What's the difference?

All three forms are excellent options, providing enhanced absorption and gastrointestinal gentleness compared to other forms of magnesium. But there are a few differences.

The primary difference is how gentle they are (which is why ours are labelled **Gentle, Extra Gentle** and **Ultra Gentle**) and how much elemental magnesium they deliver.

For example, our **Magnesium Bis-Glycinate 80 Ultra Gentle** is a fully reacted chelate. It allows for better absorption and greater protection from interfering substances like prescription medications. Improved absorption means fewer digestive upsets like those found in other magnesium forms. Hence we called it **ultra gentle**.

There is a trade off though. With increased glycine and chelation, less elemental magnesium is delivered.

Not everyone needs the level of gentleness found in **Ultra Gentle**. And many people would be better served with more magnesium! Our **Magnesium Bis-Glycinate 200 Gentle** uses the blended form, trading glycine and chelation for more elemental magnesium - over twice the amount! **Magnesium Bis-Glycinate 140 Extra Gentle** uses a buffered chelate form. It's a good in-between option since it

offers more elemental magnesium than the chelate and more gentleness than the blend.

Why is there only 80mg per capsule in the Magnesium Bis-Glycinate 80 Ultra Gentle?

Magnesium bis-glycinate chelates have a lower density compared to the blended or buffered chelate forms. The most fully chelated material that will fit into a capsule is around 800mg, delivering 80mg elemental magnesium (10% by weight). If a capsule-based product claims to contain substantially more than 80mg of elemental magnesium derived from the chelated form, it is likely not fully chelated.

So, which form is the best?

That depends on your particular circumstances and needs. We wanted to provide people with a range of options to meet their particular needs. We've provided a breakdown of these on page 44.

Can I use your product as a laxative?

No, it's not designed for it. You'll want to find a form of magnesium that is not well-absorbed. To better understand this concept, refer to the section "Why does magnesium sometimes cause diarrhea and digestive upset?" on page 38.

Where do you source your raw materials?

Our **Magnesium Bis-Glycinate 200 Gentle** uses a blended form of magnesium bis-glycinate that we source from a large trusted mineral supplier in the United States. Our **140 Extra Gentle and 80 Ultra Gentle** products use the buffered chelate and chelate forms respectively. These forms are sourced from Albion Minerals and produced in Salt Lake City, Utah.

Has the original 200mg formulation changed?

It hasn't. It's the same formulation you've come to enjoy. What has changed is our understanding of magnesium bis-glycinate. Since the release of **Magnesium Bis-Glycinate 200**, we've really improved our understanding of what magnesium bis-glycinate is and how it works. And as it improves, so do our offerings.

Not all magnesium bis-glycinates are alike. We want to make sure you have the knowledge to understand the differences and options so that you and your customers can continue to make informed decisions.

We're making sure our labels are accurate and easy to understand. And we're making sure there is a magnesium bis-glycinate that's just right for each person.

We're doing this because, while our understanding of an ingredient might change, the understanding we share has not. That's our commitment to you.

Question not answered? Let us know.

info@canprev.ca
t. 888 226 7733

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Good health is the gateway to a good life, whether it's feeling good enough to put in a productive day's work, taking in a spectacular view, keeping up with the pack on a run, playing hide and seek with the kids, or just feeling extraordinary, everyday.

CanPrev exists so that you can live the life you want, however you want, without limitations. We want to provide you the knowledge and tools to help you find your own road to good health, and the road to greater adventures.

CanPrev™

PREMIUM NATURAL HEALTH PRODUCTS

Our reason for being

CanPrev grew out of a desire to make natural medicine safe, effective and accessible to everyone. Good health is at the heart of all good passions. It is behind every shout-worthy accomplishment, every mountain climbed, every hard-earned victory.

Good health is not given. It's earned.

It involves understanding how your body works. A strong collaboration with practitioners. And supplements you can trust are reliable and powerful. These are the core values of a company started by a partnership between determined patients and natural health practitioners.

We are focused on making the best possible products that informed people and real practitioners can rely on. It demands really understanding root causes. It requires understanding the role of every ingredient before anything goes into a capsule. And it insists on the highest standards of purity and potency.

Staying true to our mission has helped to create a company that we are proud to work for. And for over a decade, our passion for good health has driven us as much as it has sustained us. We're working to put your health back into your hands.

A cancer survivor and busy mother of four, Tanya Salituro founded CanPrev in 2005 to share the passion she developed for natural health during her three separate journeys with breast cancer.

“Natural health is about the whole person. It goes beyond treating the symptoms - it also strengthens the body, mind and spirit. It leads to stronger people, stronger families, stronger communities and a stronger planet.”

Tanya Salituro
Founder, CanPrev

Why choose us?

In-house experts

Natural health practitioners are involved in everything we do: research & development, quality assurance, and education. They shape how we think and how we act - always in the best interests of the people using our products.

Premium ingredients

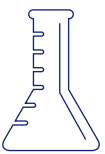
Only the finest quality materials are chosen, and our team thoughtfully reviews every ingredient to meet our exact specifications for identity, purity and potency.

Used by practitioners

Health professionals believe in CanPrev and trust our research, ingredient selection and formulations. Canadian practitioners confidently recommend them in practice.

Quality guaranteed

Health Canada licensed and manufactured at GMP licensed Canadian facilities. Every batch is tested by independent laboratories for that extra level of quality.



Advanced formulations

Our formulations combine the latest research with the best creative and critical thinking.

We are Canadian

CanPrev is proudly Canadian-owned, with natural health products developed by Canadian licensed healthcare pratitioners and made right here in Canada.

“I’m at peak performance with CanPrev”

Endurance athlete Jamie Junker has too many peaks to climb to let poor health leave him in the dust. He’s **pushing himself to the limit - and CanPrev fuels that push.**

“CORE Daily Performance Shake provides the nutrients I need to push harder in my morning workouts.”

“Pro-Biotik 15B helps keep my gut humming, especially when taken before high-protein meals.”

“ElectroMag is a must-have when locked-up muscles slow me down.”

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CanPrev™
PREMIUM NATURAL HEALTH PRODUCTS

More than **50 therapeutic** and **essential formulations** to help your path to wellness.

Therapeutics: Adrenal-Pro•Blood Sugar Support•Cold-Pro•Detox-Pro•Digestion & IBS•Eye-Pro•Fibre Flow•Healthy Heart•Healthy Hormones•Healthy Lungs•Immuno Multi•Joint-Pro•Joint-Pro NEM•Meno-Prev•Mind-Pro•Osteo Prolong•Pain-Pro•Prostate-Pro•Slim-Pro•Thyroid-Pro

Pro Essentials: 5-HTP•Adult Multi•Alpha Lipoic Acid 600•Antioxidant Network•CanPrev Core•Curcumin-Pro•D3 Drops•D3 Softgels•D3&K2 Drops•D3&K2 Softgels•ElectroMag•I-3-C•Iron Bis-Glycinate 20•L-Theanine•Magnesium Bis-Glycinate capsules & pure powder•Oil of Oregano•Omega-Pro HP 40/20•pH-Pro•Prenatal Multi•Pro-Biotik 15B•Pro-Biotik Powder•Resvera-Pro•Synergy B•Synergy C•Ubiquinol 100

2016 achievements
Elevation gained: 190,357 m
Distance travelled: 2,500 km
Summits reached: 172

Understand your health needs, then take advantage of more than **50 premium natural health products** to achieve your goals. They're designed by natural healthcare practitioners to offer therapeutic doses, the best ingredient forms, and evidence-based formulations that make sense.

THERAPEUTICS

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Blood Sugar Support

Cold-Pro™

Detox-Pro™

Digestion & IBS

Eye-Pro™

Fibre Flow™

Healthy Heart™

Healthy Hormones™

Healthy Lungs™

Immuno Multi™

Joint-Pro™

Joint-Pro™ NEM

Meno-Prev™

Mind-Pro™

Osteo Prolong™

Pain-Pro™

Prostate-Pro™

Slim-Pro™

Thyroid-Pro™

PRO-ESSENTIALS

5-HTP 100

Adult Multi

Alpha Lipoic Acid 600

Antioxidant Network™

Curcumin-Pro™

D3 Softgels

D3 & K2 Softgels

I-3-C 200

Iron Bis-Glycinate 20

L-Theanine

Magnesium Bis-Glycinate 200 Gentle

Magnesium Bis-Glycinate 140 Extra Gentle

Magnesium Bis-Glycinate 80 Ultra Gentle

Magnesium Bis-Glycinate 200 Gentle Powder

Magnesium + GABA & Melatonin for Sleep

Magnesium + Taurine, B6 & Zinc for Cardio

Magnesium Malate

Omega-Pro™ HP 40/20

pH-Pro™

Prenatal Multi

Pro-Biotik™ 15B

Pro-Biotik™ Powder

Resvera-Pro™

Synergy B™

Synergy C™

Ubiquinol 100

D3 & K2 Drops

D3 Drops

D3 Drops for kids

Oil of Oregano

CanPrev Core for Men

CanPrev Core for Women

ElectroMag™

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Adrenal-Pro™

- Helps increase energy and reduce stress and fatigue
- Enhances physical and mental performance
- Provides an improved sense of well being

Immuno Multi™

- Advanced daily multivitamin and multi-antioxidant
- 21 essential vitamins and minerals
- 10 powerful antioxidants
- The ideal core nutritional platform for all adults

Thyroid-Pro™

- Synergistic blend of nutrients and herbs that helps to support the healthy functioning of the thyroid gland
- Contains iodine naturally sourced from bladderwrack
- Contains the important cofactors selenium, zinc and copper

Cold-Pro™

- For colds, flus, and more
- Supports optimal immune function
- Speeds recovery

Healthy Hormones™

- Relieves menstrual cycle symptoms and PMS
- Relieves pain, breast tenderness and nervous tension
- Includes 400mg of Indole-3-carbinol to detoxify harmful estrogen by-products
- For estrogen dominance related conditions

Meno-Prev™

- For menopausal and perimenopausal complaints
- Relieves hot flashes, night sweats and nervous tension
- Support for mood, memory and libido
- Includes an equivalent of 3000mg maca per daily dose

Prostate-Pro™

- Reduces prostate swelling
- Improves urinary system complaints
- Supports optimal prostate health and libido
- Provides 1,500mg of Maca per dose

Blood Sugar Support

- Regulates sugar levels
- Provides antioxidant protection
- Provides support for eyes and nerves

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- Helps restore natural gut flora
- Shelf stable with a minimum 15 Billion CFU
- 5 critical, balanced, therapeutic species
- Contains bacteria naturally found in the human GI tract

Synergy B™

- Complete B complex formula in preferred forms like L-5-MTHF and methylcobalamin
- 200mg of L-theanine daily for promoting mental relaxation
- In a base of nutrient-rich spirulina

D3 & K2

- Absorption enhanced with organic coconut oil
- Helps build and maintain bone health
- Vitamin D3 cholecalciferol from lanolin
- Vitamin K2 from natto-derived MK-7

Core for Men & Women

- 18g of complete plant protein
- 30+ therapeutic nutrients
- 8 servings of antioxidant-rich superfruits and vegetables
- 7g of fibre

Curcumin-Pro™

- 1200mg daily of pure absorbable curcumin
- 100% curcuminoids from turmeric
- Potent antioxidant and anti-inflammatory action
- Absorption enhanced with phosphatidylcholine and bromelain

Ubiquinol 100

- Promotes heart health and migraine prevention
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- Vital for energy production
- With MCT oil to enhance absorption

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- Promotes a restful, relaxed state without diminishing alertness
- 90 day supply

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- 100mg of 5-HTP, derived naturally from the African plant Griffonia
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Sugar-free with Xylitol
Avec vitamine C et électrolytes
Pour une bonne santé et métabolisme
Sans colorants ni arômes artificiels
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PREMIUM NATURAL HEALTH PRODUCTS
Magnesium

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We take your health as seriously as you do, and we want you to feel confident about choosing CanPrev. If you are not 100% satisfied with your CanPrev product, just return it where you bought it for a full refund, or call us for a hassle-free replacement or exchange.

Whatever the reason, whatever the product, we'll do what it takes to make it right. Every time. That's our promise to you.

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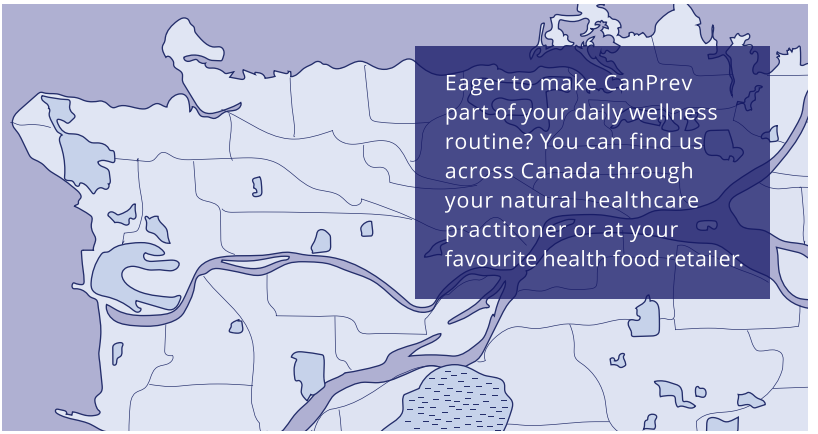

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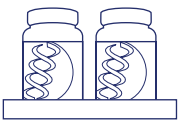
Your naturopathic doctor, nutritionist or other healthcare practitioner is a great resource for getting our products - and for great advice to get you started.

Ask your ND today



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This is a comprehensive 148-page guide to CanPrev's natural products, complete with detailed descriptions and practical health advice.

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Pure, absorbable and gentle. Just the same professional quality you've come to expect from CanPrev.

Optimized Magnesium Bis-Glycinate

Magnesium Bis-Glycinate 200 **Gentle**
Magnesium Bis-Glycinate 140 **Extra Gentle**
Magnesium Bis-Glycinate 80 **Ultra Gentle**

Goal-specific Magnesium

Effervescent Drink Mix **ElectroMag**
Magnesium **Malate**
Magnesium + Taurine, B6 & Zinc for **Cardio**
Magnesium + GABA & Melatonin for **Sleep**

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