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MAGNESIUM

by DR. CAROLYN DEAN, MD, ND

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MAGNESIUM

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better nutrition healthy living guide

Introduction
Magnesium Overview

I've been writing about magnesium since 1999 when I first began research for *The Magnesium Miracle* (Ballantine, 2007). When I was asked by Random House to produce a book on magnesium I thought it was a lofty goal. I've learned, however, that I could write a dozen books on the topic and still not cover this amazing mineral completely.

Why Magnesium?

Magnesium is a pivotal nutrient in over 325 enzyme reactions in the body ranging from energy production to cholesterol control. It took me an entire book to describe the intricacies of magnesium physiology. Miracle is the most suitable word to describe a mineral that prevents and treats diabetes, high blood pressure, high cholesterol, migraines, heart disease, osteoporosis, anxiety, insomnia, and a dozen other serious health conditions.

I've just listed several chronic conditions that people are suffering from today, yet has your doctor ever told you to take magnesium? Probably not. That's because magnesium is not regarded as a first-line therapeutic agent in medical schools, hospitals, or doctor's offices. It's also not a patentable drug. And for this reason, mainstream medicine remains blind to the extent of magnesium deficiency—a deficiency that is reported to be present in 70 to 80 percent of the population.

I've found it to be such a cornerstone for health that I can give supplemental magnesium to all my clients, no matter what their condition, and I see benefits in each and every one of them.

Why Not Magnesium?

From *The Magnesium Miracle*, here are the top 22 conditions that may be caused by magnesium deficiency. Each one can be treated with magnesium supplementation.

- Anxiety and panic attacks.
- Asthma.
- Blood clots.
- Bowel disease induced by constipation.
- Cystitis and bladder spasms.
- Depression.
- Diabetes.
- Fatigue.
- Heart disease.
- Hypertension.
- Hypoglycemia.
- Insomnia.
- Kidney stones.
- Migraine.
- Musculoskeletal conditions including fibrositis; fibromyalgia; muscle spasms; eye twitches; cramps; and chronic neck and back pain.
- Nerve problems including migraines; muscle contractions; gastrointestinal spasms; calf, foot and toe cramps; vertigo; and confusion.
- Premenstrual Syndrome; dysmenorrhea; infertility; premature contractions; preeclampsia; and eclampsia in pregnancy.
- Osteoporosis.
- Raynaud's syndrome.
- Sudden infant death syndrome.
- Tooth decay.
- Toxicity.

Lack Of Magnesium in the Diet

Cooking and processing depletes magnesium, even from those foods high in magnesium. Alcohol, coffee, sugar, and high protein in the diet are also responsible for diminished magnesium levels in the body.

Magnesium is found in seaweed, deep green leafy vegetables, nuts, seeds, and dark chocolate. Unfortunately, chocolate may be the only form of magnesium that many people are eating regularly! I say unfortunately because to take the bitterness out of chocolate, large amounts of sugar and milk are used.

Magnesium in Foods

Magnesium Content of Common Foods

Food	Magnesium (mg) per 3½oz (100g) serving	Food	Magnesium (mg) per 3½oz (100g) serving
Kelp	760	Brazil nuts	225
Pumpkin seed	532	Dulse	220
Wheat bran	490	Filberts	184
Wheat germ	336	Peanuts	175
Almonds	270	Millet	162
Cashews	267	Wheat grain	160
Molasses	258	Pecan	142
Yeast, brewer's	231	English walnuts	131
Buckwheat	229	Rye	115

Source: *The Magnesium Miracle*, page 230.

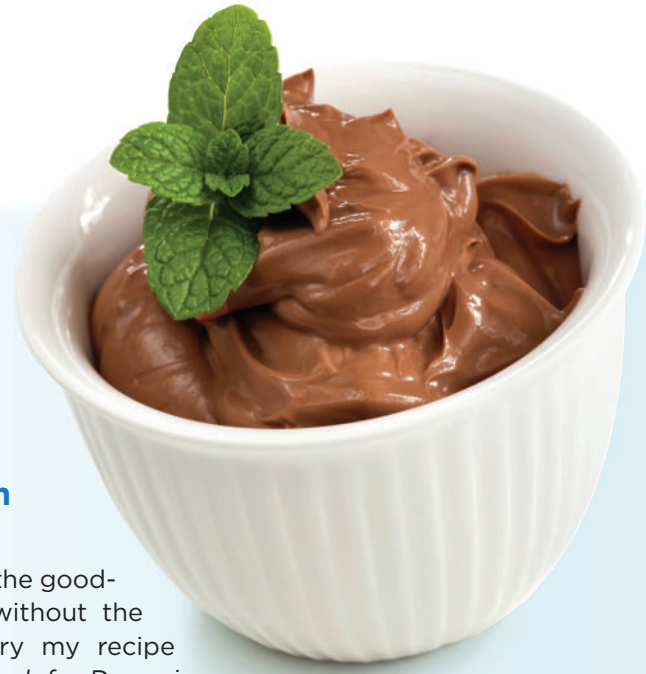
Lack of Magnesium on the Farm

Even before we start destroying magnesium in the kitchen, we've depleted magnesium in the soil. Magnesium is not a component of modern-day fertilizers. When plants have used up all the magnesium in the soil, unless it's replaced, there is none in the next crop. So, when you read the magnesium levels in the magnesium-rich foods on this page, those foods are usually grown under optimal conditions. As a result, the figures may be falsely elevated.

The folks at *Real Food Campaign* and *Remineralize the Earth* know what's required to bring us back to real food and whole food. They, and I, believe it's our only hope for long-term health and survival. For more information, I recommend that you investigate the following websites www.remineralize.org and www.realfoodcampaign.org.

Most People Are Magnesium Deficient

One of the studies I cite in *The Magnesium Miracle* is the National Academy of Sciences report showing that 80 percent of American men and 70 percent of American women don't get the Recommended Daily Allowance (RDA) of magnesium from their diets and whatever supplements they are taking. When you consider that the RDA is set too low to begin with, you realize that most Americans are magnesium-deficient.



Magnesium-Rich Dessert Recipe

If you want to get the goodness of chocolate without the sugary downside, try my recipe from the *IBS Cookbook for Dummies*.

Chocolate Banana Cream Pudding

Preparation time: 5 minutes
Cooking time: None
Yield: 2 servings

- 4 small frozen bananas, cut into rounds
- 4 ounces full-fat coconut milk
- 2 tablespoons cacao powder
- Strawberries or blueberries, for serving

Pulse the bananas, coconut milk, and cacao powder in a food processor or high-speed blender until smooth and creamy.

Serve with sliced strawberries and/or blueberries. Eat immediately to prevent melting.

Tip: Cacao powder is all the rage on the raw culinary scene, so it's getting easier to obtain at health food stores or online.

Per serving: Calories 152; Fat 6.7 g (Saturated 5.7 g); Cholesterol 0 mg; Sodium 5 mg; Carbohydrate 25.4 g (Fiber 3.5 g); Protein 2.2 g; Sugar 12.4 g.

Who Needs Magnesium

To help you decide how much magnesium to take to meet your individual needs I created the following list of factors that indicate magnesium deficiency. Consult the list and see if you are experiencing any of these symptoms. Then, take magnesium and see if your symptoms improve. You'll be doing a scientific study with yourself as the only subject. Once your symptoms improve, stop taking magnesium and see if your symptoms come back. If they do, then you have your proof.

1. Alcohol intake—more than seven drinks per week
2. Anger
3. Angina
4. Anxiety
5. Apathy
6. Arrhythmia of the heart
7. Asthma
8. Blood tests showing the following:
   a. Low calcium
   b. Low potassium
   c. Low magnesium
9. Bowel problems
   a. Undigested fat in stool
   b. Constipation
   c. Diarrhea
   d. Alternating constipation and diarrhea
   e. IBS
   f. Crohn's
   g. Colitis
10. Brain trauma
11. Bronchitis, chronic
12. Caffeine—more than three servings of coffee, tea, or chocolate per day
13. Chronic fatigue syndrome
14. Cold extremities
15. Concentration difficulties
16. Confusion
17. Convulsions
18. Depression
19. Diabetes
    a. Type I
    b. Type II
    c. Gestational diabetes
20. Fibromyalgia
21. Food intake imbalances
    a. Limited in green leafy vegetables, seeds, and fresh fruit
    b. High protein
22. Food cravings
    a. Carbohydrates
    b. Chocolate
    c. Salt
    d. Junk food
23. Gagging or choking on food
24. Headaches
25. Heart disease
26. Heart—rapid rate
27. High blood pressure
28. Homocystinuria
    Homocystinuria is an inherited disorder that affects the metabolism of the amino acid methionine.
29. Hyperactivity
30. Hyperventilation
31. Infertility
32. Insomnia
33. Irritability
34. Kidney stones
35. Medications
    a. Digitalis
    b. Diuretics
    c. Antibiotics
    d. Steroids
    e. Oral contraceptives
    f. Indomethacin
    g. Cisplatin
    h. Amphotericin B
    i. Cholestyramine
    j. Synthetic estrogens
36. Memory impairment
37. Mercury amalgams
38. Menstrual pain and cramps
39. Migraines
40. Mineral supplements
    a. Taking calcium without magnesium
    b. Taking zinc without magnesium
    c. Taking iron without magnesium
41. Mitral valve prolapse
42. Muscle cramps or spasms
43. Muscle twitching or tics
44. Muscle weakness
45. Numbness of hands or feet
46. Osteoporosis
47. Paranoia
48. Parathyroid hyperactivity
49. PMS
50. Polycystic ovarian disease
51. Pregnancy
    a. Currently pregnant
    b. Pregnant within one year
    c. History of preeclampsia or eclampsia
    d. Postpartum depression
    e. Have a child with cerebral palsy
52. Radiation therapy, recent
53. Raynaud's syndrome
    Raynaud's syndrome is is a condition in which cold temperatures or strong emotions cause blood vessel spasms that block blood flow to the fingers, toes, ears, and nose.
54. Restlessness
55. Sexual energy diminished
56. Shortness of breath
57. Smoking
58. Startled easily by noise
59. Stressful life or circumstances
60. Stroke
61. Sugar, high intake daily
62. Syndrome X
63. Thyroid hyperactivity
64. Tingling of hands or feet
65. Transplants
    a. Kidney
    b. Liver
66. Tremor of the hands
67. Water that contains the following
    a. Fluoride
    b. Chlorine
    c. Calcium
68. Wheezing

Chapter One
The Stress Mineral

You may not realize that stress is the number one reason why people visit their doctor. Back in the early 1980's, *Time Magazine* acknowledged that stress was the "Epidemic of the 80's." As far as I can tell, it's only gotten worse. We're juggling more than one job, several hand held devices, extended families, a bad economy, and a diet filled with junk food, not to mention global and environmental threats that are drummed into our brains via TV and the Internet. How can our bodies adapt to such an overabundance of change?

The American Institute of Stress (AIS), which was founded by the famous Canadian stress expert Hans Selye, MD, estimates that 75 to 90 percent of all visits to primary care physicians are for stress-related problems. Here are the reactions to stress as outlined by AIS:

- Heart rate and blood pressure soar, increasing the flow of blood to the brain to improve decision making.
- Blood sugar rises to furnish more fuel for energy as the result of the breakdown of glycogen, fat, and protein stores caused by adrenalin surging.
- Blood is shunted away from the gut, where it is not immediately needed for digestion, to the large muscles of the arms and legs to provide more strength in combat, or greater speed in fleeing a scene of potential peril.
- Clotting occurs more quickly to prevent blood loss from lacerations or internal hemorrhage.

What I found amazing about this list is the role that magnesium plays at every stage of stress reactions. For example:

- When blood pressure soars, the smooth muscles in the walls of your blood vessels can go into spasm if you are magnesium-deficient. This can cause chronic hypertension.
- When blood sugar rises, magnesium is responsible for insulin opening up cell membranes to allow sugar into the cells. If you are magnesium-deficient, blood sugar continues to rise and cells do not receive glucose.
- If the large muscles of the arms and legs are magnesium-deficient, increased circulation can cause muscle cramping, irritability, and restless leg syndrome.
- Without enough magnesium, blood clotting can become enhanced leading to leg, lung, and brain clots.

Stress is the number one reason why people visit their doctor.

Magnesium for Anxiety and Panic Attacks

Magnesium deficiency can cause some pretty alarming problems, including heart attacks. I'll speak about magnesium and heart health in Chapter Two but first let me talk about the stress of panic attacks that can make a person feel that they are having a heart attack several times a day.

Panic attacks have the added side effect of opening the door to polypharmacy (the use of multiple drugs). Doctors don't really know what panic attacks are or what causes them but they are familiar with anti-anxiety drugs. So, most people who experience even one panic attack are immediately treated with anti-anxiety drugs like Xanax or Ativan. If those drugs don't work, more are added. These drugs can include Prozac, other selective serotonin reuptake inhibitor (SSRI) antidepressants, and even antipsychotics.

A panic attack is not necessarily a disease. I'll explain in a moment

how even low blood sugar can trigger symptoms that are misdiagnosed as panic attacks. And lack of magnesium can make them worse. If we're missing a key natural component of the nutrient fuel our bodies need in order to properly operate, doesn't it make sense to supply that natural fuel first before looking to drugs to suppress the symptoms?

Magnesium is an important treatment for panic attacks because it helps calm the body in many different ways. It helps promote muscle relaxation, nervous system balance, proper adrenal function, and the production of normal amounts of serotonin.

If you are deficient in magnesium your muscles can be abnormally tight. Magnesium makes muscles relax; calcium does the opposite. If you have too much calcium and not enough magnesium, your muscles become tense and tight. They can even develop calcium deposits, something that can occur in those suffering from fibromyalgia. Tight jaw muscles can lead to teeth grinding and headaches. It's like your walking around with all your muscles clenched and you don't even know it. Try that for a few minutes and see how painful that can be.

When magnesium levels are deficient, you can be walking around as tight as a drum and don't know why you are experiencing anger, apathy, apprehension, confusion, eye twitches, fatigue, insomnia, muscle weakness, nervousness, poor concentration, poor memory, a racing heart, and trembling.

I've seen accomplished and competent people melt into puddles of tears when they develop anxiety and panic attacks. But it's not psychological as doctors claim. It can simply stem from a nutritional deficiency of magnesium and a poor diet.

One of the main triggers of a panic attack is low blood sugar. You're late for work and you grab a coffee and donut. Your blood sugar soars and propels you into your day. But on the drive to work your blood sugar crashes. Your adrenal glands release adrenaline to break down the sugar stored in your liver. This keeps your brain from starving and prevents you from falling to the floor in a faint. However, the adrenaline surge makes your heart race and your palms sweat in a fight or flight response. Sitting at the wheel of your car your mind starts racing, spinning into a cycle of worry and panic. If you're crossing a bridge at the same time, you may even develop a phobia of bridges and high places.

If you go to see your medical doctor, he or she probably won't ask you what you had for breakfast but they will give you a diagnosis of panic disorder and write a prescription for Xanax. If your doctor asks you if you've felt down lately, have trouble sleeping, and feel you are under too much stress (which are all symptoms of magnesium deficiency), you may be also offered an antidepressant like Prozac. These drugs are handed out

Magnesium is an important treatment for panic attacks because it helps calm the body in many different ways.

like mood candy. But make no mistake, these drugs are very powerful chemical compounds with long lists of alarming side effects. And recent studies show they may work only 40 percent of the time to make people feel better. That means they work less often than placebos.

If you are a Type A personality living on adrenaline, time pressure, and stress, you can be a walking magnesium wasteland. Most people know that Type A's are susceptible to heart disease, muscle spasms, hypersensitivity, and irritability. It's not your genes, however. You've got a magnesium deficiency caused by stress which burns up this vital mineral leaving you vulnerable to stress-related conditions.

Magnesium and Headaches

Headaches are a sure sign of stress. Your shoulders are hunched, your neck muscles are tight, and the tension spreads to the dozen or so muscles of your scalp. Magnesium can lessen the tension in those muscles and help all your muscles relax. It's not just tension headaches that are created by magnesium deficiency. Migraines, PMS headaches, and post-traumatic headaches are all affected by this miracle mineral.

To give you an indication of the scope of magnesium's actions, here are the many ways that magnesium can treat migraines:

- Magnesium relaxes the blood vessels and allows them to dilate, reducing the spasms and constrictions that can cause migraines.
- Magnesium regulates the action of brain neurotransmitters and inflammatory substances, which may play a role in migraines when unbalanced.
- Magnesium inhibits excess platelet aggregation, preventing the formation of tiny clots that can block blood vessels and cause pain.
- Magnesium relaxes muscles and prevents the buildup of lactic acid, which, along with muscle tension, can worsen head pain.

Chapter Two

Heart Disease

Magnesium deficiency is very common in people with heart disease. I see it all the time in my clients who have angina, heart palpitations, heart arrhythmias, hypertension, blood clotting, and poor circulation. In some hospitals where doctors understand the importance of magnesium, it is administered immediately for acute myocardial infarction and cardiac arrhythmia. Like any other muscle, the heart stays in a flexible, relaxed state when it has enough magnesium.

It seems pretty straightforward that magnesium should be used for any heart symptoms, but there is still an ongoing debate in the medical community about whether magnesium has a place in the treatment of heart disease. Part of the problem is that there is no accurate blood test for magnesium.

Only one percent of the total magnesium in the body is located in the blood stream, and that amount is kept at a standard level by several checks and balances orchestrated by the body. That means, as your blood magnesium goes down, your body pulls magnesium out of your bones and tissues. If it goes too high, you lose magnesium through your urine or bowels. So, when a doctor dips into your blood and does a blood magnesium test, it's usually going to look normal. And because magnesium levels always seem to be normal it's not even a routine test in most hospitals.

A better test is a red blood cell (RBC) magnesium test which can give you an indication of magnesium at the cellular level. But cells only contain about 40 percent of the body's magnesium. A slightly better test is an ExaTest. This test uses tissue scrapings from under your tongue which are then examined under an electron microscope. It's available through naturopaths and chiropractors. But even that test is not as precise as the research-only blood test for ionized magnesium. This test measures blood levels of free magnesium that is not bound to other minerals or to protein. I do hope this test will be made more available to practitioners so they can be more accurate in their diagnosis of magnesium deficiency.

When doctors do research on magnesium, they test this simple mineral on the "worst of the worst" and if it doesn't prevent mortality and morbidity in heart arrhythmia and heart attack it is dismissed as insignificant.

Of course, these doctors are missing the point that magnesium is a necessary mineral for the integrity of the heart muscle and the smooth muscle of blood vessels. To expect it to bring people back from the dead is unrealistic and may even be a subtle way of sidelining magnesium and its benefits in favor of drug therapy. My advice, and that of a growing number of my nutrition-oriented medical colleagues, is for you to take magnesium on a daily basis to protect your heart—and the rest of your body—so you don't end up with magnesium deficiency symptoms that can land you in the hospital!

Too Much Calcium

Calcium contracts and magnesium relaxes muscle and nerve cells. The way calcium works has everything to do with how it interacts with magnesium. Let's look at the dynamics of calcium and magnesium inside and outside a cell. First of all, magnesium is necessary in order to keep the mineral channels working properly. If there is a magnesium deficiency, the mineral channels don't open and close properly and calcium floods into the cells. When that happens, cells can go into spasm.

> If calcium accumulates in the cell, it disrupts cell function and can lead to angina, high blood pressure, arrhythmias, asthma, atherosclerosis, and even heart attacks.

Magnesium, A Natural Calcium Channel Blocker

When heart muscle cells contain too much calcium, they can go into a life-threatening spasm that we call heart attack. When they have enough magnesium, the heart muscle cells relax.

Calcium enters the cells of the heart by way of calcium channels that are jealously guarded by magnesium. Magnesium is the ultimate

gatekeeper. Magnesium in the cells is maintained at a concentration 10,000 times greater than that of calcium. Magnesium allows only a certain amount of calcium to enter cells to create necessary electrical transmissions, and then immediately ejects the calcium once the work is done.

Why? If calcium accumulates in the cell, it causes hyperexcitability and calcification. This disrupts cell function and can lead to angina, high blood pressure, arrhythmias, atherosclerosis (through buildup of calcium and cholesterol in the arteries), and even heart attacks. The prescription medication to prevent calcium buildup is called a calcium channel blocker. Nature's calcium channel blocker is magnesium; it's the guardian angel of the heart.

Hypertension and Magnesium

The most commonly used drugs for hypertension (high blood pressure) are diuretics. The irony of using diuretics is that they deplete the body of magnesium. Here's an example of a very common story I often hear: Sara is 60 years old. She goes to her doctor for her annual check up and her blood pressure is a little high. Her mother just passed away and Sara has been under a great deal of stress. But her doctor didn't ask what was going on in her life and the appointment was too rushed for her to blurt it out.

As you are already aware, stress can deplete magnesium levels. But Sara's doctor—thinking she was developing hypertension simply because she was getting older—immediately put her on a diuretic drug, even though aging is not a cause of hypertension.

When Sara went back a month later to see if the drug was working, her blood pressure was even higher. Her doctor didn't know why but, if you know anything about magnesium, you'll realize it was because the diuretic was driving down Sara's magnesium levels. Yet her doctor thinks he's caught Sara's rising blood pressure early and has to provide even more aggressive treatment. He puts Sara on a second antihypertensive drug. A few weeks later, and seemingly out of the blue, Sara's cholesterol levels become elevated. Again, it is likely due to lower magnesium levels. But instead of recommending supplemental magnesium, the doctor puts her on a cholesterol-lowering statin drug.

Another month passes and Sara's blood sugar level is elevated. Triggered by her abnormal reading, her doctor puts Sara on a diabetic drug. One of the agreed upon signs of diabetes is low magnesium. But that's not even considered by her doctor.

The Lipid Loving Mineral

Magnesium is necessary for the activity of an enzyme that lowers LDL, the "bad" cholesterol. This enzyme also lowers triglycerides and raises the "good" cholesterol, HDL. Another magnesium-dependent enzyme converts omega-3 and omega-6 essential fatty acids into prostaglandins, which are required for heart and overall health.

All in all, at least eighteen human studies have verified that magnesium supplements can have an extremely beneficial effect on lipids. In these studies, total cholesterol levels were reduced by 6 to 23 percent; LDL (bad) cholesterol were lowered by 10 to 18 percent; tryglycerides fell by 10 to 42 percent; and HDL (good) cholesterol rose by 4 to 11 percent. Furthermore, the studies showed that low magnesium levels are associated with higher levels of "bad" cholesterol and high magnesium levels indicate an increase in "good" cholesterol.

Sara is now on four drugs to treat symptoms that are primarily caused by a magnesium deficiency. And all these drugs are depleting her magnesium stores. Psychologically, Sara is now afraid that she must have severe heart disease to require all these drugs.

During this six month scenario, Sara's magnesium levels are never tested. But even if some bright young resident runs a magnesium blood test, it will likely be the wrong one because only 1 percent of the body's magnesium is in the blood. As I mentioned earlier, magnesium in the blood is crucial and the amount is guarded by powerful feedback mechanisms so it will usually look normal unless the levels in the tissues are dangerously low.

Magnesium and Diabetes

As noted in Sara's story, magnesium deficiency is a risk factor for diabetes. That fact is listed in doctor's diagnostic manuals but unfortunately many doctors don't seem to act upon this information. Many clients have told me that when they start taking magnesium their blood sugar levels normalize.

In *The Magnesium Miracle*, I wrote that magnesium enhances insulin secretion and helps insulin transfer glucose into cells. Without sufficient magnesium, glucose and insulin build up in the blood, causing various types of tissue damage. Adopting a good diet and taking magnesium are the first steps in treating diabetes—not introducing diabetic drugs.

Magnesium and Cholesterol

The majority of the cholesterol in the body is made in the liver. Most of it does not come from our diet. Making cholesterol requires a specific enzyme called HMG-CoA reductase. If there is enough cholesterol in the body, magnesium slows this enzyme down. If more cholesterol is needed to make hormones or coat every cell of our body with a fatty layer, magnesium speeds it up. Somehow, our cholesterol has been hijacked by drug companies who try to control the amount of cholesterol made with anti-cholesterol drugs called statins. They are designed to completely inhibit HMG-CoA reductase.

Magnesium is the natural way the body controls cholesterol when it reaches a higher level, whereas statin drugs are used to destroy the whole process. If sufficient magnesium is present in the body, cholesterol will be limited to its necessary functions—the production of hormones and the maintenance of cell membranes—and will not normally be produced in excess.

Magnesium is the natural way the body controls cholesterol when it reaches a higher level.

Magnesium and Blood Clots

Magnesium has an important role to play in preventing blood clots and keeping the blood thin—without any side effects. Calcium doesn't dissolve completely in the blood and it's a well know fact that it promotes blood clotting. However, magnesium dissolves calcium along with the unnecessary blood clots that calcium produces. There is a simple experiment you can do to show this property. Stir a half-teaspoon of calcium powder in a glass of water. You'll see that it won't fully dissolve. Then add a half-teaspoon of magnesium powder and miraculously the magnesium dissolves immediately and makes the calcium flakes disappear. The same thing happens in your blood stream.

Of course blood clotting is a necessary function when you get injured or want to heal from surgery. Calcium's ability to initiate blood clotting is only one of the factors involved. If you are taking magnesium it will never mean that you won't clot anymore. However, having enough magnesium will prevent abnormal clotting.

Chapter Three

Healthy Women and Children

I received only two hours of nutrition classes during my four years in medical school and magnesium was never discussed. Neither did it come up in my clinical work in the hospital—except once. In my third year, I was observing in obstetrics and a young woman was about to deliver twins. The problem was, her blood pressure was rising, she was bloated, and she was convulsing because of excess fluid in her brain. I wondered what they could possibly give her to stop the seizures, bring down her blood pressure, get rid of the edema—and not harm the baby.

Before I knew it, the attending physician ordered an IV bag of magnesium to drip into her veins. In short order, her blood pressure came down, she stopped having seizures, and she started eliminating fluid. It was a monumental experience for me knowing that the mother and baby were safe and it was due to magnesium. Since I was already studying nutrition on my own, I began wondering why magnesium wasn't the first line of therapy for fluid retention, high blood pressure, and seizures for everyone. When I asked about this, I was told that there were perfectly good drugs to use for everyone else and we didn't have to bother with magnesium!

Magnesium and a Healthy Baby

Magnesium is a vital component of a healthy pregnancy and delivery. Having enough magnesium during pregnancy can improve your baby's health from day one. But the need for it begins even before birth. Many studies suggest that magnesium can prevent premature contractions, eclampsia, and greatly reduce the risk of a child suffering cerebral palsy and sudden infant death syndrome (SIDS). I believe that—like folic acid—magnesium, in effective dosages, should be a required supplement for pregnant women.

Many symptoms in pregnancy, such as constipation, leg cramps, backaches, fluid retention, irritability, and insomnia, are really the symptoms of magnesium deficiency. I've even seen magnesium help women with fertility problems get pregnant because it relieves fallopian tube spasms that can prevent egg implantation!

All in all, the requirement for magnesium begins from conception and continues throughout our lives.

Magnesium and Jane's Top Ten

Here's an excellent case history demonstrating the benefits of magnesium. When Jane first came to see me, she filled out a symptom survey and scored 275. A healthy person would have either no symptoms or a score of 10. But after three months on magnesium citrate powder, Jane sent me her "top ten" improvements which resulted in a dramatic reduction in her score.

1. **Less knee pain.** Our knees take the brunt of our weight. The knee is just a simple ball and socket joint that is held in place by the thigh muscles and the leg muscles. If those muscles are tight or in spasm, that alone can cause slight displacement of the knee that, over time, can turn into arthritis of the knee. While pain medication or knee surgery to "clean out the joint"are the primary treatments in mainstream medicine, magnesium should be the treatment of choice.
2. **Carbohydrate/sugar cravings were down** from 90 to 5 on a scale of 100. Magnesium is a necessary cofactor in the proper metabolism of carbohydrates. It also helps insulin work properly to put sugar inside cells where it belongs and not leave it in the blood stream where it can continue to cause sugar cravings.
3. **Facial wrinkles and crevices diminishing.** This was a new benefit of magnesium that I hadn't heard before. It is likely due to an improvement in tissue integrity, hydration, and cell health, all of which are important effects of magnesium balance.
4. **Dramatic reduction in migraine headaches.** Migraines can cause the most severe pain known to humans. They are debilitating and said to be incurable. Life-long pain medications seem to be the only option that doctors can offer. However, Jane and thousands of other readers of *Magnesium Miracle* have gotten relief from migraines and headaches by using magnesium. In the book I talk about also using the herb feverfew and some vitamin B_6 (25 mg twice a day) if magnesium alone doesn't give full relief.
5. **Periods went from dark to bright red; from severe clots to minimal.** Magnesium works in several ways to lessen the intensity of menstrual flow. It oxygenates the blood and detoxifies it, changing dark toxic flow to bright red. Magnesium also thins the blood, naturally breaking up clots.
6. **Able to exercise intensely for the first time in years.** Prior to this, Jane would have been exhausted for at least three days after any type of exercise. She likely didn't have enough magnesium to neutralize the build up of lactic acid and instead ended up with aches and pains. Also, one of the first symptoms of magnesium deficiency is fatigue. When you lack ATP—the cellular energy packets that are formed with the help of magnesium—then you just don't have the "oomph" you need. For some, exercise boosts energy levels, but only if they have enough ATP.
7. **Sleep has improved from "minimal" to "poor and restless."** When your body is magnesium deficient, it's as if your cells and nerves are on edge. They are tight, contracted, and ready to snap. If you lie down in that state, neither your body nor your mind can relax and you toss and turn all night. Simply helping your muscles relax by giving them the proper amount of magnesium turns off that tension and allows you to slip into sleep.
8. **Able to feel energetic after 6:30 p.m.** Without enough magnesium, the energy the body gets from ATP is diminished and this can have a negative effect on your "staying power."
9. **Less sound sensitivity/hypersensitivity.** Studies done in the cockpit on pilots show an increased sensitivity to sound in the face of magnesium deficiency.
10. **Better able to concentrate.** Jane's attentiveness would be hampered, especially if there was a lot of background noise. Poor concentration is not something you will find in a list of symptoms for magnesium deficiency. However, it makes sense that if your body is tense and you are sensitive to sound, you may have trouble concentrating.

All in all, Jane's list lends great credibility to the benefits of magnesium. Clinical medicine is based on cases like Jane's, where she is her own one-person experiment.

Many of my clients have said that they've proven the benefits of magnesium over and over because when they run out of their supplements, some of their symptoms return. Those who are critical of taking supplements may say that these people are "addicted" to magnesium. Yet magnesium is a vital nutrient that we simply can't live without. Because of our magnesium-depleting diet and lifestyle, supplementation is critical.

Excess Calcium Depletes Magnesium

The balance between magnesium and calcium is very delicate. Since I've been writing about magnesium, I've come to realize that we are actually

overloading ourselves with too much calcium. In fact, I say that the epidemic of heart disease in women may have its origins in the excessive intake of medically-prescribed calcium.

The blame can partly be laid on the osteoporosis industry. Bone density tests are viewed as the gold standard to determine whether a person (mostly women) should take bone density drugs and high doses of calcium.

All in all, we're living in a calcified world. In our diet, the amount of calcium compared to magnesium is extremely high. There is more calcium than magnesium in the soil. Magnesium is lost during the processing and cooking of food. On top of that, women are told to take thousands of milligrams of unabsorbable calcium to prevent osteoporosis. Calcium is also found in many food products, including yogurt and orange juice. All of these factors add up to an excess of calcium—and nobody seems to realize that we also need equal amounts of magnesium in the body.

Bones Need Magnesium Too

The more calcium you take without the balancing effect of magnesium, the more symptoms of magnesium deficiency and calcium excess you experience. The osteoporosis you are trying to prevent can actually occur because of this imbalance. You may also develop heel spurs, kidney stones, gallstones, atherosclerosis, fibromyalgia, and breast cyst calcification. These are all symptoms of calcium excess that can be overcome with the right balance of magnesium.

What's the answer? If we could get all of our calcium from our diet, we should not have a calcium buildup in the body. Plants have a unique way of only absorbing submicroscopic-sized minerals into their rootlets, chelating minerals with certain proteins, and making them available for direct absorption by animals. That's why I recommend daily intake of smoothies made from collard greens, kale, and Swiss chard as a way to get your calcium and some of your magnesium. In fact, you may be able to meet all of your calcium needs with diet alone—however, you may still be magnesium deficient. Review the list of magnesium-rich foods on page 6 and try to include as many of them as possible in your diet every day. It's also wise to augment your magnesium stores with a balanced liquid calcium-magnesium supplement like Osteo Calm by Natural Vitality. Osteo Calm is specifically designed to support healthy bones with a readily absorbed form of calcium and magnesium citrate.

Magnesium and PMS

Many women who've read what I have to say about magnesium have told me their PMS symptoms are greatly reduced by taking magnesium.

The more calcium you take without the balancing effect of magnesium, the more symptoms of magnesium deficiency and calcium excess you experience.

PMS occurs two to 14 days before the start of your period and nobody really knows why. Bloating, fluid retention, irritability, and a host of other symptoms can come and go in a cyclic fashion.

When women introduce magnesium into their diet, they often find that their extreme PMS symptoms are relieved. Magnesium acts as a mild diuretic, relaxes muscles, and enhances serotonin (the "feel good" neurotransmitter). When magnesium is deficient, women can experience fluid retention, muscle tension, and mood imbalance along with their period.

Children Need Magnesium

Magnesium deficiency affects children just as it does adults. However, a lot of their magnesium deficiency symptoms are attributed to other things.

I've been amazed at the physical and behavioral changes in kids with ADHD and autism when their parents simply start to bathe their children in a warm bath to which magnesium salts have been added. Constipation disappears, skin quality improves, mood improves, irritability lessens dramatically, and social interaction gets better. Of course, diet is also important. I highly recommend a gluten-free, casein-free diet.

You can read more in my booklet, *Kids Health*, where I also say that magnesium is an important step in improving your child's physical, mental, and emotional health. In the book, I also outline other important nutritional supplements for kids that complement magnesium. One of the best I've found is Kids Natural Calm Multi, which is also by Natural Vitality.

Chapter Four
The Foundational Nutrient For Athletes

If you are an athlete, you may be at greater risk for a mineral deficiency, and that is particularly true for magnesium. One reason is because one of the easiest ways to lose magnesium is through sweat.

Magnesium and Muscles

Magnesium relaxes muscles and calcium contracts them. As we discussed earlier, magnesium is the gatekeeper that allows only a small (but necessary) amount of calcium into a cell and then forces it out. It's a simple dynamic that occurs every millisecond of every minute in our bodies. But when this process goes wrong, most people experience the effects of calcium-magnesium imbalance.

Magnesium deficiency causes muscle and nerve twitches and spasms. A painful charley horse can turn your calf muscles into rocks when you stretch. It's a condition that is almost impossible to live with. And if you participate in sports, cramping can be very serious. It can cause injuries and can sideline an athlete from a competition.

If you're lucky, you've read about magnesium or heard about it from a friend or a health care provider. You may use magnesium salts in a bath or have a magnesium citrate drink and your muscles sigh in relief.

Animal studies demonstrate that decreased exercise capacity can be an early sign of magnesium deficiency. When given magnesium, endurance is restored. Most human studies confirm that any form of exercise depletes magnesium. We sweat it out and stress it out and need extra magnesium to neutralize lactic acid.

Magnesium is the most important nutrient for athletes to enhance performance, prevent lactic acid buildup, and shorten recovery time. Most doctors and coaches don't know much about magnesium because it doesn't readily show up on blood tests. To see if you're deficient, familiarize yourself with the list of magnesium deficiency triggers in the introduction of this booklet. Then start supplementing with magnesium and see if your symptoms improve.

Many of my clients are former athletes who haven't fully replaced their magnesium stores in years. Even though they were strong competitors and stars in their field, they now find they are anxious and suffer panic attacks as their bodies develop a level of tension and irritability that they can't decipher. If they see a doctor about their symptoms, they are usually given a prescription for Xanax to ease their anxiety and Prozac or Wellbutrin for depression.

Magnesium is a simple mineral that is often overlooked for more sensational, sexy, and expensive supplements. Regardless of what you add on top of it, magnesium is part of the foundational nutrition any athlete needs. Let me give you the practical experience of one doctor whose patients benefit from the use of magnesium. David Pascal, DC, was a gold medalist in the 1983 World Games for the 1,500-meter run and has been in private chiropractic practice since 1987. His clients include athletes who participated in two Olympic Games, three World Championships, and 25 U.S. Championships. Dr. Pascal's track and field athletes at Beijing 2009 won 20 medals—10 gold, five silver, five bronze.

Dr. Pascal's secret weapon is nutrition and a hefty dose of magnesium. While his program is individualized, magnesium is the key nutrient that he recommends. Pascal says:

"Magnesium is actually the 'stress mineral' and is needed for about 325 different chemical processes within the body. By stress mineral I mean that a body uses a lot of magnesium to handle physical stress, chemical stress, and mental stress. Of course, athletes are under a tremendous amount of… stress, and so magnesium is absolutely vital for them to perform at their best."

Muscle Cramping

Symptoms can range from a slight twitch, a joint pulled out of place, or bruising on the skin, and may require manual stretching to help release its hold. The most common cramping is found in the calf and the thigh. The cause of muscle cramps is still in the theoretical stage. These theories include:

- Neuromuscular control imbalance.
- New activity.
- Muscle fatigue.
- Dehydration.
- Electrolyte depletion or imbalance.
- Poor conditioning.

Of course, I know that muscle cramping in athletes is mostly due to a lack of magnesium, and so does Dr. Pascal. As I mentioned earlier, this

mineral is not recognized as an important electrolyte that needs to be replaced when there are losses due to stress, sweat, and poor diet. There are also no accurate blood testing methods to properly measure magnesium.

In the meantime, myself, Dr. Pascal, and thousands of other doctors and athletes are convinced that magnesium works. Each day we do experiments on our own bodies and prove its effectiveness. When I moved to Maui, I started walking one-and-a-half hours a day along the beach and swimming for a half hour to forty-five minutes. I also started to get calf cramping and heart palpitations that were previously under control with magnesium supplementation. I realized that I was utilizing more magnesium with my extra activities and sweating more in the hot climate. My symptoms were gone within just a few days once I increased my magnesium intake.

Medical Treatment of Cramping

If you've suffered cramping you've probably been told that they will go away on their own. You may also have been advised to stop your activity or gently stretch out or massage the affected muscle. But if you're an athlete who falls during a competition due to muscle cramping, that's not good enough. Stretching and warm ups aren't going to improve your magnesium stores. Only magnesium can do that.

Many of Dr. Pascal's athletes come to him with a history of muscle cramping. It's the first clue that they are magnesium deficient. And because he addresses the problem with magnesium, none of his clients suffer from cramping issues. Dr. Pascal says that "When I was in Eugene, Oregon, this summer for the Olympic Trials, I treated 40 of my athletes. One of the things I really had to be concerned about was the heat and muscle cramping, and so I used magnesium preventatively. *Take your magnesium*. That's the first thing I said when I saw the athletes in the morning and the last thing I told them at the end of the day. None of my athletes had muscle cramps—before, during, or after their races." Many others did. It's the worst thing that can happen to an athlete and can result in muscle tears that can take them out of competition for an entire season.

Dr. Pascal is aware how much of an impact heat has on athletes. "As you sweat, you're losing magnesium, which is water soluble. In addition, you'll be sweating out electrolytes, and of course water, too. These losses mean that the ratio of calcium to magnesium will be changing in the body. The percentage of calcium will increase, and since calcium is a muscle contractor, the muscles cramp." The truth is, you may sweat out a tiny bit of calcium but you sweat out much more magnesium—and that's where the problem lies.

When you lose one to two liters of fluid per hour while training intensely in the heat, you can lose enough sodium, potassium, and

magnesium through your skin to encrust your clothes with minerals. In military postings in the Middle East, it's not uncommon for soldiers to talk about how their T-shirts dry as hard as boards due to all the minerals they sweat out. Yet, replacing fluids with sports drinks that are filled with water, sodium, and sugar just focuses on salt and fluid loss. These solutions don't address the necessity of replacing magnesium and potassium as sodium and water are replenished.

Dr. Pascal discusses the importance of minerals in general. He says that "…most people think they have a problem with heat due to the high temperature or humidity. This isn't true. Heat builds up in the cells primarily because there are not enough minerals and electrolytes to carry the heat out of the cells. If there are enough of these elements, along with

water, it wouldn't matter how hot it was—the cells would never overheat and people would never get heat stroke because the minerals would transfer the heat out of the cells."

How Much and When

When it comes to magnesium, there isn't a specific dose for a given health condition. How much magnesium to take has to be determined by your symptoms and your reaction to magnesium.

The RDA for magnesium is about 400 mg of elemental magnesium. However, many people need much more than that. I'm one of them. If I don't take enough magnesium, I get heart palpitations, leg cramps, and twitchy muscles. However, if I take my daily dose all at one time in pill form, the magnesium can overwhelm my intestines and cause a laxative effect.

One of the best ways to take magnesium is in powder form. Magnesium citrate powder dissolves immediately in water, so you know your body doesn't have to wait for a capsule or tablet to break down. You can also put 400 mg of magnesium citrate powder in a glass of water or right into your water bottle and sip over several hours. That way the magnesium is absorbed slowly and effectively into your body instead of running through your intestines.

I find that some people get so excited about taking magnesium that they forget to slowly build up their dose. And we all think that "more is better." Taking too much magnesium initially might create a laxative effect you weren't expecting, giving you the mistaken impression that you are having a bad reaction to magnesium. To prevent this, I think it's important to start with a lower dose of 150 to 200 mg and build up to 400 mg once or twice a day until your bowel movements are comfortably loose.

The need for magnesium will vary from person to person. Don't be surprised if you need a certain amount of the mineral while your partner needs twice as much. Also, there is a greater requirement for magnesium during periods of stress, heavy athletic activity, or physical work. The best way to achieve a healthy magnesium level, even during times of excess stress or activity, is with a magnesium citrate powder you can take every day. Several products from the Natural Vitality line contain the high quality magnesium citrate that I've referred to several times throughout this booklet. It's also the magnesium that Dr. Pascal uses with his athletes. You'll find Natural Vitality products at your neighborhood health food store.

Selected References

1 Akizawa Y. Daily magnesium intake and serum magnesium concentration among Japanese people. *Journal of Epidemiology*. 18(4):151-159. 2008.

2 Barbagallo M. Magnesium metabolism in hypertension and type 2 diabetes mellitus. *American Journal of Therapeutics.* 14(4):375-385. 2007.

3 Bo S. Dietary magnesium and fiber intakes and inflammatory and metabolic indicators in middle-aged subjects from a population-based cohort. *American Journal of Clinical Nutrition*. 84(5):1062-1069. 2008.

4 Bonny O. Mechanism of urinary calcium regulation by urinary magnesium and pH. *Journal of the American Society of Nephrology.* 19(8):1530-1537. 2010.

5 Cahill AG. Magnesium for seizure prophylaxis in patients with mild preeclampsia. *Obstetrics and Gynecology.* 110(3):601-607. 2007.

6 Doyle LW. Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus. *Cochrane Database Systematic Reviews.* (1):CD004661. 2009.

7 Eby GA. Magnesium for treatment-resistant depression: a review and hypothesis. *Medicine Hypothesis.* 74(4):649-660. 2010.

8 Evangelopoulos AA. An inverse relationship between cumulating components of the metabolic syndrome and serum magnesium levels. *Nutrition Research.* 28(10): 659-663. 2008.

9 Ford ES. Intake of dietary magnesium and the prevalence of the metabolic syndrome among U.S. adults. *Obesity (Silver Spring)*. 15(5):1139-1146. 2007.

10 Guerrero-Romero F. The effect of lowering blood pressure by magnesium supplementation in diabetic hypertensive adults with low serum magnesium levels: a randomized, double-blind, placebo-controlled clinical trial. *Journal of Human Hypertension*. 23(4):245-251. 2009.

11 Ho KM. Use of intravenous magnesium to treat acute onset atrial fibrillation: a meta-analysis. *Heart.* 93(11):1422-1440. 2007.

12 Ishimi Y. Nutrition and Bone Health. Magnesium and Bone. *Clinical Calcium*. 20(5):762-767. 2010.

13 Ismail Y. The underestimated problem of using serum magnesium measurements to exclude magnesium deficiency in adults; a health warning is needed for "normal" results. *Clinical Chemistry and Laboratory Medicine.* 48(3):323-237. 2010.

14 Jacka FN. Association between magnesium intake and depression and anxiety in community-dwelling adults: the Hordaland Health Study. *Australian-New Zealand Journal of Psychiatry.* 43(1):45-52. 2009.

15 Killilea DW. Magnesium deficiency accelerates cellular senescence in cultured human fibroblasts. *Proceedings of the National Academy of Sciences USA.* 105(15):5768-5773. 2008.

16 Köseoglu E. The effects of magnesium prophylaxis in migraine without aura. *Magnesium Research*. 21(2):101-108. 2008.

17 Kowal A. The use of magnesium in bronchial asthma: a new approach to an old problem. *Archivum immunologiae et therapiae experimentalis.* 55(1):35-39. 2007.

18 Larsson SC. Magnesium intake and risk of type 2 diabetes: a meta-analysis. *Journal of Internal Medicine*. 262(2):208-214. 2007.

19 Mathers TW. Oral magnesium supplementation in adults with coronary heart disease or coronary heart disease risk. *Journal of the American Academy of Nurse Practitioners.* 21(12):651-657. 2009.

20 Mazur A. Magnesium and the inflammatory response: potential physiopathological implications. *Archives of Biochemistry & Biophysiology.* 458(1):48-56. 2007.

21 Nielsen FH. Moderate magnesium deprivation results in calcium retention and altered potassium and phosphorus excretion by postmenopausal women. *Magnesium Research*. 20(1):19-31. 2007.

22 Nielsen FH. Dietary magnesium deficiency induces heart rhythm changes, impairs glucose tolerance, and decreases serum cholesterol in post menopausal women. *Journal of the American College of Nutrition.* 26(2):121-132. 2007.

23 Rayssiguier Y. High fructose consumption combined with low dietary magnesium intake may increase the incidence of the metabolic syndrome by inducing inflammation. *Magnesium Research*. 19(4):237-243. 2009.

24 Rozenberg P. Magnesium sulphate for the management of preeclampsia. *Gynecology, Obstetrics and Fertility.* 34(1):54-59. 2006.

25 Rumawas ME. Magnesium intake is related to improved insulin homeostasis in the Framingham offspring cohort. *Journal of the American College of Nutrition.* 25(6):486-492. 2006.

26 Shi Z. Joint association of magnesium and iron intake with anemia among Chinese adults. *Nutrition.* 24(10):997-984. 2008.

27 Sontia B. Role of magnesium in hypertension. *Archives of Biochemistry & Biophysiology.* 458(1):33-39. 2007.

28 Takaya J. Possible relationship between low birth weight and magnesium status: from the standpoint of "fetal origin" hypothesis. *Magnesium Research*. 19(1):63-69. 2006.

29 Tsai CJ. Long-term effect of magnesium consumption on the risk of symptomatic gallstone disease among men. *American Journal of Gastroenterology.* 103(2):375-382. 2008.

30 Waters RS. Intravenous magnesium sulfate with and without EDTA as a magnesium load test–Is magnesium deficiency widespread? *Biological Trace Element Research.* 124(3):243-250. 2008.

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MAGNESIUM

THE MASTER MINERAL

Dubbed the multi-tasking mineral, magnesium is a critical but often overlooked nutrient for the prevention of asthma, diabetes, heart disease, insomnia, migraines, osteoporosis, and more. That's not surprising since magnesium plays a key role in over 325 enzyme reactions in the body—from energy production to cholesterol control. But as important as magnesium is for optimum health, up to 80 percent of Americans suffer from a deficiency. Dr. Carolyn Dean, MD, ND, helps you understand why you may be deficient and how low magnesium levels impact your overall health. She also gives you the tools you need to naturally enhance your body's magnesium stores through smart supplementation and a magnesium-rich diet.

ABOUT THE AUTHOR OF THIS BOOKLET

Carolyn Dean, MD, ND, author of *The Magnesium Miracle* (Ballantine Books, 2007) and 22 other books and eBooks, has been at the forefront of natural medicine for more than 30 years. She holds a medical license in California and is medical director of the Nutritional Magnesium Association (www.nutritionalmagnesium.org). Dr. Dean has a complimentary newsletter and an online wellness program called *Future Health Now!*, which is her answer to the current healthcare crisis. Her web site is www.drcarolyndean.com.

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