

Dedication

I dedicate this book to health professionals and practitioners all over the world who have already embraced the miracle that magnesium offers and incorporate this essential nutrient into their recommendations and protocols;

to the “magnesium mavericks,” individuals who have already soaked up this information like they soak up their magnesium and then pass it along to everyone they meet;

and all my new readers who are coming to this information looking for a solution to their particular health challenge. May this knowledge, combined with effective magnesium supplementation, transform your health as it has for countless millions.

I'm pleased to say that since the 2014 revised edition of *The Magnesium Miracle*, magnesium research has skyrocketed. In the past five years, close to 12,000 publications about magnesium appeared in the PubMed database. By the time this free chapter of my newest edition of *The Magnesium Miracle* is in your hands there will likely be another 3,000.

It's been wonderful to see a definite public groundswell of interest in magnesium. In commercial terms, magnesium is the fastest-rising product on the supplement market. Sales of magnesium supplements are catching up with and even surpassing calcium supplement sales. Statisticians also analyze what topics are being searched on the Internet, and magnesium is getting its fair share of hits.

There is more than enough proof that people should supplement with magnesium for a myriad of conditions. In fact, I think everyone could benefit from magnesium supplementation, whether you suffer from magnesium deficiency or simply wish to prevent it. I've updated this edition with the latest magnesium research, most of which is online, so you can read it yourself. Through the miracle of the Internet you can find abstracts to most if not all of my references and, in many cases, free access to entire papers. It's so important to educate yourself about the benefits of magnesium since, in spite of all the evidence, researchers continue to call for more studies on the topic, rather than recommending magnesium to the public. That's right—even though research repeatedly proves magnesium deficiency causes dozens of diseases and symptoms, rarely do medical organizations openly endorse magnesium supplementation.

ARRHYTHMIA AWARD

One such rare organization is the Heart Rhythm Society in the United Kingdom. In the fall of 2012 I was given the Arrhythmia Alliance Outstanding Medical Contribution to Cardiac Rhythm Management Services Award. Arrhythmias can be life-threatening, and the only treatment options are to learn to cope with the mild ones or treat the moderate to serious ones with drugs and surgical ablation.

One of my own personal magnesium deficiency symptoms is heart palpitations, so I know how scary and disruptive they can be. It is very distressing to actually feel your heart working improperly. I often tell people, "You don't have a heart problem; you have a magnesium problem." As I've noted many times, the highest amount of magnesium in the body is found in the heart.

I was quite amazed to receive this award because the Heart Rhythm Society is very science-and research-oriented. By honoring me, they acknowledged the important role of magnesium in the treatment of arrhythmia. This award is proof that magnesium research has hit the mainstream, and there is no going back!

It was this award and all the mail I receive about arrhythmias being reversed with magnesium that convinced me to write a book called *Atrial Fibrillation: Remineralize Your Heart*. The fact that serious heart arrhythmias can be affected by such a simple mineral as magnesium makes people more willing to accept its importance in improving health. I'll give you a long excerpt from that book in Chapter 7.

Below I'd like to share a few emails that I've received from people with arrhythmias whose lives have been dramatically improved by using magnesium:

Dr. Dean, a few months ago I wrote to you regarding my amazing results after using magnesium to suppress PVCs [premature ventricular contractions] and PACs [premature atrial contractions]. It has been almost six months and I still wake up every morning thanking God for this mineral!

Another person, who had almost given up at the age of only thirty-one, wrote a long account that will resonate with many readers:

*I want to thank you so much for your book *The Magnesium Miracle*. It is no overstatement to say that it has changed my life overnight. I'm only thirty-one years old, but for over ten years I have been plagued by premature atrial contractions, premature ventricular contractions, and tachycardia. I was told by multiple doctors that I was fine and to just go home and ignore the arrhythmias. I kept crawling back to the doctors hoping that they could offer me some solution, but all they would do is run more tests and try to put me on Zoloft.*

There was one year that I had more echocardiograms than haircuts! Several months ago, my palpitations increased from the once-in-a-while range to several times every day. While desperately reading through some posts in an online forum I saw several people singing the praises of your book and the wonders of magnesium, which had worked for them. I purchased some magnesium and after prayerfully taking my first dose four days ago I have not had a single PVC since! It's truly a miracle.

Even though the first day after starting magnesium I was double slammed with a terrible head cold and the first day of my period, I still had zero palpitations. Ordinarily a day like that would have me kicking out PVCs like a popcorn machine.

I just want to run through the streets kicking up my heels! I have already convinced half a dozen people to read your book and give magnesium a try for various ailments. This supplement has been such a blessing to me and has given me my life back. I am so glad there are people like you out there willing to point patients in a natural direction for good health. I would be honored, flattered, and proud to have you share my story. Please continue in your efforts to bring more light to this miracle.

Why aren't more doctors telling their patients with arrhythmias to take magnesium? Mostly because they never learned about magnesium supplementation in medical school—and every doctor is told that if you didn't learn about something in medical school, it isn't important. Also, since some arrhythmias can become fatal, doctors tend to treat all arrhythmias as fatal, justifying the handful of medications they prescribe. I'll say more about magnesium and arrhythmias, especially atrial fibrillation, in Chapter 7.

THERAPEUTIC MAGNESIUM

Unlike most doctors, I'm here to endorse magnesium! In fact, this book is one long, passionate recommendation for supplemental magnesium. With the 2017 edition of *The Magnesium Miracle*, I find myself on both sides of the discussion, and I want to make this disclosure at the outset. I am a writer and clinical researcher presenting to the public the latest scientific and clinical information about the healing properties of magnesium. I am also an entrepreneur, having invented a superior form of magnesium

that is helping thousands of people where other forms of magnesium could not. I'm actually in the position of a scientist who, in the middle of the experiment, realizes that it would be unethical to withhold the data already collected.

Like many experts and researchers who have become intimately familiar with their topic, I have identified a major problem with most if not all of the forms of magnesium recommended by health practitioners—the laxative effect, which often occurs before a person can experience the full supplemental effect. Because of my own magnesium deficiency symptoms and my inability to take magnesium supplements without the laxative effect, I developed a highly absorbed, non-laxative magnesium product called ReMag. It's not my intention to promote ReMag here – just tell you that it's available should you want to find it in the marketplace.

THE IMPORTANCE OF MAGNESIUM

I constantly receive emails from people with questions, stories, and comments about their experience with magnesium. Every day I learn something new, either from individuals or from the scientific literature. I want very much to give you all this important information. I know I have a whole book to do it in, but I want to impress upon you immediately how crucial magnesium is, the fact that it's no longer readily available in our food, and that you may need a particular kind of magnesium to achieve and maintain magnesium saturation.

I know that it's going to take a lot more effort to change erroneous perceptions that the public, other authors, and health care practitioners have about magnesium. Because it has become a very popular topic, there are a handful of new books and hundreds of online articles about magnesium. There is also a plethora of vitamin books that mention magnesium. Unfortunately, they all repeat the same inaccurate information that “you will know you are taking enough magnesium when you reach the laxative effect.” However, magnesium oxide is their treatment of choice—even though it is only 4 percent absorbed and therefore highly laxative

These books also repeat the warning that if you have kidney disease, you should be wary of magnesium, and if you have kidney failure, it could be harmful. With the current emphasis on medical testing, people who have even slightly elevated creatinine, BUN, or eGFR levels on their kidney function tests are made to fear magnesium, when in fact they are probably magnesium-deficient.

I have found that kidney patients, even those on dialysis, can safely take a picometer, stabilized ionic form of magnesium for their debilitating leg cramps and heart palpitations. One woman reports that her magnesium levels drop after every dialysis treatment because there is so little magnesium in the IVs they use during the procedure. That means with every treatment she comes closer to a life-threatening magnesium-deficiency heart attack. See the section “Kidneys Need Magnesium” in Chapter 11 for her story.

TOP 10 MAGNESIUM FACTS

As I mentioned earlier, I want to give you a taste of the importance of magnesium at the beginning, and I'll do that with my Top 10 Magnesium Facts, which will be discussed in more detail throughout the book.

1. Magnesium is necessary for the proper functioning of 700–800 enzyme systems in the body—that’s why it can be implicated in scores of symptoms and dozens of health conditions. I mention some of these enzyme systems in Chapter 2 in “Magnesium’s Many Roles.”
2. Most people (70–80 percent) are magnesium deficient, so this book is for you.
3. Calcium depletes magnesium in the body, and many people get too much calcium, either as supplements, in fortified foods, or in dairy products. I cover this in “The Dance of Calcium and Magnesium” in Chapter 1.
4. Magnesium is very deficient in the soil and in the food supply, so it must be supplemented. This information is detailed in Chapter 2.
5. Therapeutic doses of magnesium are impossible to obtain in those who suffer the laxative effect before their symptoms can be relieved. Fortunately, people can now get a picometer form of magnesium that can be taken without the laxative effect. See Chapter 18 for more details.
6. Mitochondrial dysfunction is no longer a mystery. Adenosine triphosphate (ATP) energy molecules are made in the mitochondria via the Krebs cycle. Six of the eight steps in that cycle depend on magnesium. See Chapter 16 for more information.
7. To help you identify your magnesium needs, I’ve created the list “100 Factors Related to Magnesium Deficiency” detailed in the chapters of my book.
8. The definitive test that would tell you your magnesium levels, the ionized magnesium blood test, is not available to the public. A helpful but less accurate test, magnesium RBC, must be used in conjunction with your clinical symptoms. The serum magnesium test is highly inaccurate, yet it is still the standard test used in hospitals, clinics, and most clinical trials—however, it doesn’t even appear on an electrolyte panel. See Chapter 16 for more on magnesium testing.
9. Magnesium deficiency is a major factor in chronic disease—diabetes, heart disease, high blood pressure, high cholesterol, migraines, irritable bowel syndrome (IBS), and heartburn. The drugs used to treat all these conditions deplete magnesium, often making symptoms worse. I list many of these unsafe drugs in Chapter 2.
10. Telomeres, which are components of chromosomes, hold the key to aging, as does magnesium, which prevents telomeres from deteriorating. I cover the latest research in Chapter 15.

LONG-STANDING MAGNESIUM DEPLETION

Magnesium deficiency is nothing new, but that information has not been passed on to the general public so that they can take action in their own self-interest. Proof of this can be found more than seventy years ago, in the following statement on soil mineral depletion, which was read into the record of the 74th Congress, 2nd session (Senate document no. 264), 1936:

Do you know that most of us today are suffering from certain dangerous diet deficiencies which cannot be remedied until depleted soils from which our food comes are brought into proper mineral balance? The alarming fact is that foods (fruits, vegetables, and grains) now being raised on millions of acres of land that no longer contain enough of certain minerals are starving us—no matter how much of them we

eat. The truth is that our foods vary enormously in value, and some of them aren't worth eating as food.

Our physical well-being is more directly dependent upon the minerals we take into our systems than upon calories or vitamins or upon the precise proportions of starch, protein, or carbohydrates we consume.

Laboratory tests prove that the fruits, the vegetables, the grains, the eggs, and even the milk and the meats of today are not what they were a few generations ago. No man today can eat enough fruits and vegetables to supply his stomach with the mineral salts he requires for perfect health, because his stomach isn't big enough to hold them! And we are turning into a nation of big stomachs.

It's clear to me that since that time, the mineral depletion of our agricultural soil has never been corrected and it's only gotten worse.

WHY HAVEN'T WE HEARD ABOUT MAGNESIUM?

People are more magnesium-aware than they were sixteen years ago when I began my magnesium crusade, so I'm grateful for that. However, the vast majority of schoolchildren are never exposed to nutritional education in school. What about doctors—the people who should know the biochemical workings of the body? Unfortunately, doctors generally do not learn about nutrition or nutrient supplementation in medical school because they are studying disease, not wellness.

I like to talk about my 200 hours of biochemistry in medical school, where I learned about all the nutrient cofactors necessary for every biochemical reaction. But I was likely the only one who recognized their importance because of my extensive study of nutrition before I went into medicine.

When you visit a medical doctor, in your mind you may think you are going there to improve your health or prevent illness, but doctors have little time to educate their patients about how to keep themselves well. What's on their mind is searching for a diagnosis for your symptoms and matching a drug to their diagnosis.

Patients often will not change their lifestyle or improve their nutrition on their own, believing that if diet and supplements were so important, the doctor would have told them. Nutrition is not even a medical specialty. It wasn't a specialty when I went to medical school in the 1970s and it still isn't today! That's why you won't hear most of the information I report in this book from your doctor—because it's outside his or her field of knowledge and expertise.

Basically, doctors only know what they know, and if you ask them anything about health and disease that they don't know, they will simply say it's not important. It's not important because they never learned about it in medical school, which was supposed to teach them everything. Do you see how dangerous this cyclical logic can be?

WHEN ALL YOU HAVE IS A HAMMER

In the first two years of medical school I learned all about diseases; the second two years I studied drug treatments for those diseases. We spent no time on nutrient deficiencies. Have you heard the expression “When all you have is a hammer, everything begins to look like a nail”? That is very much the case with doctors and drug treatments. Even worse, with thousands of drugs in the pharmaceutical compendium, it is quite impossible for doctors to keep up on the latest drugs, and impossible to prevent side effects or serious drug interactions. This is especially true with the polypharmacy practiced today, where medical providers prescribe combinations of drugs that have never been studied together until they reach your body.

Studies show that most doctors are unable to recognize drug side effects, instead confusing them with a need to increase the dose rather than stop the drug. Although allopathic medicine is said to be scientific, most patients are on more than one drug at a time, and there are no studies proving the safety of drug combinations. **Let me repeat —there is no science to prove the safety or efficacy of taking more than one drug at a time.** Most studies are done using one drug at a time. When a person is on a dozen drugs, all bets are off. There have been a few studies using what’s referred to as a “polypill,” made up of several drugs for preventing heart disease, diabetes, and hypertension, but in all the studies I have seen, the side effects always outweigh any benefits.

According to magnesium expert Mildred Seelig, M.D., while a tremendous amount of magnesium research has been done in India, Britain, France, and a number of other countries, doctors in the United States use the excuse that not enough research has been done here for them to feel informed enough to prescribe it. Dr. Seelig calls this the “not-invented-here syndrome.”

Pioneers such as Drs. Bella and Burton Altura, however, continue to do original magnesium research in the United States. Every year for the past forty years they have produced on average a dozen peer-reviewed journal articles on magnesium and ionized magnesium testing. Their research convinces even die-hard skeptics—when they take the time to become informed—of the clear need for magnesium supplementation and the absolute requirement for accurate testing.

DRUG COMPANIES FUND MOST MEDICAL RESEARCH

Medical science studies one symptom at a time, in isolation, and generally tries to find one cause for that symptom and one drug that treats it. The bias of medical research is to search for a patentable drug that will eventually pay for the costly studies necessary to bring it to market. There is general agreement that magnesium is indispensable for health, disease prevention, and all life processes, but it has been ignored because there is no profit to be made in selling a common nutrient that cannot be patented.

There is no advertising budget for magnesium compared to the hundreds of millions of dollars spent on advertising prescription drugs, and nutrients do not get media attention. To make matters worse, over the past two decades the bulk of university funding has come from the pharmaceutical industry, which primarily funds drug research. [1, 2]

There is also no incentive for anyone to test magnesium in large clinical trials since they could never recoup the money spent on the trial. Yet doctors seem to be waiting for such a trial, where 20,000 people taking magnesium are followed for life. In a perfect world, that study should have been initiated decades ago. Do we have the luxury of waiting for the results of such a study started now? No, we do not. Do we presently know enough about magnesium to recommend widespread supplementation? Yes, we do.

Doctors may have heard years ago that magnesium offered some promise in heart disease, but they haven't read any new studies, so they assume that the treatment must not have panned out. Drs. Burton and Bella Altura, who wrote the foreword to this book, have published more than 1,000 studies on magnesium. With each passing year, their research recedes further into the past, with the risk of being ignored.

An analysis of seven major clinical studies shows that intravenous magnesium reduced the risk of death by 55 percent after acute heart attack. These results were published in the prestigious *British Medical Journal* and the widely-read journal *Drugs*. [3,4] With such positive scientific results and doctors claiming that they practice "scientific medicine," why isn't IV magnesium being routinely given to everyone who presents in the ER with an acute heart attack?

As noted, Drs. Bella and Burton Altura have been researching magnesium and its clinical application for more than forty years. [5] The ionized magnesium electrode, produced by Nova Biomedical of Waltham, Massachusetts, at the Alturas' urging, and tested at the State University of New York's Downstate Medical Center by the Alturas, has given doctors a reliable magnesium test and taken the guesswork out of diagnosing magnesium deficiency. [6] With such testing in hundreds of clinical trials, the Alturas and groups of other researchers have been able to show that dozens of health conditions are unequivocally related to magnesium deficiency. These are among the conditions listed below and titled "Sixty-Five Conditions Associated with Magnesium Deficiency."

Dr. Alexander Mauskop, working with the Alturas, has proven the connection between migraines and magnesium many times over and puts magnesium treatment into practice at the New York Headache Center. [7, 8, 9] Dr. Mildred Seelig has contributed comprehensive reviews on magnesium at New York Medical College, the American College of Nutrition, and the Department of Nutrition, University of North Carolina.[10, 11] Dr. Jean Durlach, president of the International Society for the Development of Research on Magnesium (SDRM), editor in chief of *Magnesium Research*, and professor at St. Vincent de Paul Hospital in Paris, has done extensive reviews of ongoing magnesium research.[12, 13]

All these magnesium experts agree that we can no longer sit on the sidelines or reserve judgment on the benefits of magnesium; we need to implement what we know, now.

I've been saying for many years that you have to take charge of your own health—and one way of doing that is to study all the information I provide about magnesium, find out if you are suffering from magnesium deficiency, and learn what you can do to correct the problem.

MAGNESIUM IS NOT A DRUG

In the past few years I've noticed a mushrooming of medical websites that have decided to treat vitamins and minerals like drugs. Since nutrients aren't drugs and don't act like drugs, and since drugs, by definition, have side effects, such misinformed websites give people the impression that supplements can have side effects and can be dangerous. This is very confusing to the consumer and contrary to the evidence.

In 2003 I wrote a paper called "Death by Medicine," [14] and later a book called *Death by Modern Medicine: Seeking Safe Solutions*, [15] wherein I enumerated statistics about iatrogenic illness (illness caused by medical treatment) for prescription drugs and for supplements. While there are no deaths from supplements, the *Journal of the American Medical Association* stated that between 90,000 and 160,000 deaths per year occur from using FDA-approved drugs, making drugs the fourth-most-common cause of death. That figure doesn't include medical and surgical mistakes or preventable deaths from smoking, high blood pressure, and being overweight. [16] Tragically, the researcher who reported these findings, Dr. Barbara Starfield, may herself have died an iatrogenic death in 2011.

When anti-supplement critics insist there have been deaths caused by dietary supplements, they are referring to a single batch of tryptophan, tainted with a genetically engineered additive, that was sold in the late 1980s.

The very few reports of magnesium "toxicity" are in hospitalized patients overdosed with IV magnesium. Unfortunately, these reports are constantly repeated inappropriately and irresponsibly. The reality is that there are only certain people with serious health conditions, who are usually already under a doctor's care, who are warned not to take magnesium. There are only four contraindications to magnesium therapy: kidney failure, myasthenia gravis, excessively slow heart rate, and bowel obstruction. You will find those my closing remarks in this chapter.

Medical websites will talk about magnesium's side effect of diarrhea, not understanding that this is the body's mechanism for avoiding a buildup of magnesium. But diarrhea can also happen when anyone takes a large amount of magnesium at one time, causing a relative overload, or if you take magnesium products that are so poorly absorbed they act like laxatives. Read "The Fail-Safe of Magnesium" later in this Introduction. The laxative effect can also happen in people like me who have a sensitive or irritable bowel, but there is now a safe non-laxative form of magnesium in picometer size that you can take without the laxative effect.

The University of Maryland posted an article online about interactions between magnesium and drugs. The article warns people not to use magnesium if they are also taking antacids, laxatives, fluoroquinolone antibiotics, calcium channel blockers, or medications for diabetes. I won't refute every statement they make because I'd have to interpret their illogical approach. Suffice it to say that the warnings do not take into consideration that magnesium can be a safe substitute for many of these drugs or that these medications can deplete magnesium. I warn people about taking any of the drugs in the above list, and if they must take them, to double or triple their intake of a highly absorbable form of liquid magnesium to counteract the inevitable magnesium drain.

The tendency for medical practitioners and government agencies to medicalize nutrients and categorize them as drugs, playing up rare and sometimes imaginary side effects, I believe, comes from an organization called the Codex Alimentarius Commission. The commission is run by two groups that are part of the United Nations,

the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), with disputes being adjudicated by the World Trade Organization. Codex sets the standards for food and dietary supplements being shipped across borders. I've attended Codex meetings in Europe, and I realized that pharmaceutical companies have taken a great interest in Codex; their intent is to make sure that nutrient levels of dietary supplements are not high enough to be therapeutic, so that they will not "interfere" with prescribed medications. Ultimately, they want nutrients to be treated like drugs and only prescribed by doctors. Many people who take magnesium have been successful in reducing or even eliminating their medications, which can't please the pharmaceutical companies. A reputable organization, Alliance for Natural Health, recognizes the dangers that Codex brings and can educate you about the problems we face as its worldwide rulings come into effect. [17]

When I attended a nutrition seminar hosted by the National Center for Complementary and Alternative Medicine at the National Institutes of Health (NIH), one of the speakers stated that NIH's mandate was to issue guidelines on the Recommended Daily Allowance (RDA) for nutrients only to prevent deficiency diseases—for example, how much vitamin C we should take to prevent scurvy. She said that the NIH had no interest in or mandate to research supplements for the prevention and treatment of disease. This attitude probably arises from the lack of education about nutrients in medical school. Because doctors know only what they have been taught, they fear what they don't know; this makes it easier for them to box magnesium into the drug category and close the lid.

MAGNESIUM MISINFORMATION

There are hundreds of ways that our bodies utilize magnesium, which makes it impossible for science to identify its "most important function." This approach of looking for the single pivotal function of a supplement is based on the medical model of "one symptom, one diagnosis, one drug." Science depends on this model to isolate one variable at a time for scientific testing. They don't seem to realize that it would be unreasonable and impossible to limit a food nutrient such as magnesium in that way, since it is involved in as many as 800 enzyme systems, affects 80 percent of the body's biochemistry, and interacts with dozens of other nutrients.

There are stacks of papers from researchers all over the world proving the value of magnesium. However, those thousands of papers, including the 1,000 research papers authored by the doctors who wrote the foreword to this book, Drs. Burton and Bella Altura, unfortunately seem to have done nothing to make the public aware of the importance of magnesium. Researchers will just keep getting funding to repeat the same studies and doctors will continue to ignore them because they never learned anything about the clinical application of magnesium in medical school.

I've said it before and I'll say it again: we can't wait for a multibillion-dollar clinical trial to "prove" that magnesium is a necessary nutrient. We have enough research showing its therapeutic value, safety, and efficacy. What's more, people can do their own personal clinical trial by following their magnesium RBC test results and taking magnesium as they watch their symptoms subside. See Chapter 16 for more on magnesium testing and Chapter 18 for my magnesium supplement recommendations.

Magnesium is safe, and people are deficient in it. For every hundred emails I get describing positive responses to magnesium, I get only one that asks if the sender might be having a negative reaction. Later in this chapter I will provide you with a list of possible outcomes you can consider as you learn about the transition symptoms that can occur when you begin to take magnesium or when you take too much too soon.

MAGNESIUM RESEARCH AND REVIEWS

The Magnesium Miracle has been a bestseller since it first appeared in 2003. On Amazon, it has occasionally moved into the Top 100 Bestsellers and typically holds the number one position in the “Vitamin and Supplement” book category. It’s also received close to 1,000 product reviews from readers. *The Magnesium Miracle* is not just a great book to read; it has helped improve the health of hundreds of thousands of people and saved countless lives.

What impresses me about the current state of magnesium research is the sheer number of review articles and meta-analyses as many groups of investigators summarize what is known about this important mineral. A decade ago science in general didn’t give magnesium much thought, but today all of those papers acknowledge the depth and breadth of magnesium’s impact on the body. Even so, that information still hasn’t made it to the doctor’s office or into the patient’s treatment plan. As I noted above, most of these reviews are freely available on the Internet, where you can read them and scan their citations to see the extensive web of information about the benefits of magnesium that can no longer be denied. You can even print them out to help educate your doctors and garner their support for your magnesium therapy.

I have to hold myself back from wanting to reference every new publication, which would make this book excessively long and dry. When you come to a heavily referenced section, like the following, you don’t have to read every word; you can skim through it and just note the richness of the available magnesium research.

ADD MAGNESIUM TO DESALINATED WATER

I think that the most important study of this decade is a paper titled “Desalinated Seawater Supply and All-Cause Mortality in Hospitalized Acute Myocardial Infarction Patients from the Acute Coronary Syndrome Israeli Survey 2002–2013.”¹⁸ One of the coauthors of the study, Dr. Michael Shechter, has been lobbying for magnesium supplementation of the Israeli water supply for many years. Three-quarters of Israeli water is desalinated and therefore devoid of minerals.

In a July 2016, personal email to me and eleven other magnesium experts, Dr. Shechter described that in this study “we investigated patients with acute myocardial infarction in Israel . . . dividing the patients into 2 areas: those who live in areas with desalinated seawater (almost no magnesium) and those who live in areas with regular tap water (normal magnesium levels).” The results were shocking: “We found an amazing increased 1-year mortality rate in patients who live in a desalinated water area compared to normal water, which was also reflected in their serum magnesium levels.”

The results of this study appear to have frightened the Israeli public, spurring a media frenzy. Michael said that “following our preliminary announcement all media in Israel was very busy reporting the results in on-air discussions and for 2 consecutive days I’ve

been interviewed on prime-time news on Israel national TV. The result is that our Prime Minister Mr. Netanyahu decided to add magnesium to the desalinated water!”

I heartily congratulated Dr. Shechter, and told him, “I know you put your heart into this study because the government wouldn’t accept your request to add magnesium to DSW [desalinated water] years ago. Now you have thoroughly proven them wrong! Already they have changed their minds and are adding magnesium to the DSW!”

This study has huge worldwide implications because in some areas drinking water is filtered extensively, distilled, or subjected to reverse osmosis, which can reduce or remove the good minerals along with the bad. Most bottled water, unless it is mineral water labeled with a list of mineral ingredients, is distilled or treated with reverse osmosis.

It is through our water that we are supposed to receive magnesium and all our other minerals but we no longer have this luxury. Dr. Shechter has proven beyond a shadow of a doubt that any drinking water that does not contain sufficient levels of magnesium can cause heart attacks!

However, as of February 2017, the pilot project to add magnesium to the desalinated drinking water of Ashkelon, Israel, has become bogged down in bureaucratic bickering over funding. In order to educate the Israeli public about the estimated four thousand Israelis who die annually due to magnesium deficiency, largely because they drink magnesium-deficient desalinated water, Dr. Shechter promoted Magnesium Awareness Week in February 2017. He hopes this will further motivate the government to take action to save lives.

MAGNESIUM REVIEWS

In 2001, at the same time I was writing the first edition of *The Magnesium Miracle*, an excellent review was published by Fox and colleagues, citing sixty-seven references. [19] The investigators stated that three biologic mechanisms could potentially explain how magnesium helps treat hypertension, diabetes, and hyperlipidemia.

- First, magnesium deficiency causes a dysregulation of the sodium-magnesium exchange, resulting in higher intracellular sodium and thus higher blood pressure.
- Second, a relatively low magnesium level creates an intracellular imbalance between calcium and magnesium, which results in increased spasms in the smooth muscle of arteries and therefore increased blood pressure.
- Third, magnesium deficiency causes insulin resistance, which in turn causes hyperinsulinemia, resulting in hypertension, diabetes, and hyperlipidemia.

Fox and his team cite study after study showing the importance of magnesium in many chronic conditions. They report on studies using IV magnesium therapeutically in critical situations such as acute asthma, torsades de pointes (ventricular tachycardia), and preeclampsia. Yet their only conclusion is to call for more funding and more research to see if magnesium supplementation will have a positive effect on hypertension, diabetes, and hyperlipidemia. They conclude: “The clinical implications of replacement therapy, if successful, would have a profound effect on improving the health of the population.”

Personally, I think that withholding this vital information from the public has actually reached the point of malpractice.

A 2015 review repeats all the same information in the Fox paper but with additional references; there were 149 citations. [20] Gröber and his team report that 100 years ago the magnesium content of our diet was about 500 mg/day and that today this has plummeted to 175–225 mg/day. I've referenced this fact for years, but I rarely see it mentioned. They also provided the research proof that magnesium deficiency can cause an alarming number of diseases and disease symptoms. It's a laundry list of our chronic diseases, which are occurring in epidemic numbers and cannot be cured by drugs: attention deficit hyperactivity syndrome (ADHS), Alzheimer's, cardiac arrhythmias, asthma, type 2 diabetes, heart disease, heart failure, hypertension, metabolic syndrome, migraine headaches, myocardial infarction, preeclampsia, eclampsia, and stroke. Several conditions for which investigators feel magnesium is promising but which require further research include anxiety, depression, dysmenorrhea, fatigue, fibromyalgia, hearing loss, kidney stones, premenstrual syndrome, osteoporosis, and tinnitus.

After all this great information in their 12,000-word paper about the importance of magnesium, shored up with study after study, what did Gröber and colleagues recommend? I was very disappointed to see that they devoted a mere seventy words to how to treat these serious magnesium deficiency diseases. For dosage, they simply repeat the very lowest recommendation, 4–6 mg/kg/day (220–325 mg daily for a 120-pound person). The first supplement recommendation they make is for the highly laxative magnesium oxide, and the last one on their list is magnesium aspartate, which, according to neurosurgeon Dr. Russell Blaylock, is toxic. [21] (I discuss Dr. Blaylock's concerns about magnesium aspartate in the section "Migraine Mechanisms" in Chapter 4.)

Two other reviews by Volpe, in 2013 and 2015, are titled "Magnesium in Disease Prevention" [22] and "Overall Health and Magnesium and the Athlete." [23] These papers are very similar to the previous reviews, but the citations are for only the ten years prior to publication, as if research from earlier years is now somehow invalid. And these reviews do not list any magnesium supplement recommendations.

The latest study by Drs. Burton and Bella Altura, the brilliant, compassionate, and hardworking doctors who have authored well over 1,000 papers on magnesium, in conjunction with a team of investigators, presents a masterly review of the existing literature on the topic of aging and gives an overview of their entire body of work. I'll give more details about this paper in Chapter 15. [24]

Back in 1999, when I suggested to magnesium expert Dr. Mildred Seelig that I would like the Alturas to write a foreword for *The Magnesium Miracle*, she told me that they were such prominent scientists that they would never be associated with a lay publication. As it turned out, the timing was perfect for our collaboration. The Alturas were completely frustrated because despite all the papers they had written and all the proof they had of the necessity and efficacy of magnesium supplementation in dozens of conditions, their message had never left the ivory tower of the university and reached the public. Each paper that the Alturas have published educates the reader about the incredible potential of magnesium to prevent and treat chronic disease.

Long and Romani wrote a review in order to “advocate for the necessity of identifying easy and reproducible methods to assess serum and cellular magnesium levels and to identify magnesium deficiency in order to alleviate related pathological conditions.” [25] Their study acknowledges that serum magnesium is a “poor predictor of tissue magnesium content and availability.”

A 2016 review also took up the notion that we aren’t using the proper measurement techniques for magnesium, seeking to “present current analytical challenges in obtaining accurate and reproducible test results for magnesium.” [26] The investigators presented magnesium as a cation (positively charged ion) of great physiologic importance. They said magnesium exists in two states: a form that is bound with another substance and a free ionized form. The form magnesium is in depends on temperature, pH, ionic strength, and competing ions. It is the free ionized magnesium form that participates in hundreds of biochemical processes and that can be measured by ion-selective electrodes in the ionized magnesium test. The researchers said that “too many magnesium studies use total serum magnesium levels rather than its free bioactive form making it difficult to correlate to disease states.” As the authors state, it is the free ionized form of magnesium that participates in the body’s biochemical processes. (It is of note that a unique proprietary process transforms the magnesium chloride in ReMag into a stabilized magnesium ion state, allowing the stabilized ions to be completely absorbed at the cellular level and not be automatically bound to another substance.)

The 2015 review “Magnesium in Man: Implications for Health and Disease” provides an extensive and comprehensive summary of magnesium research over the last few decades, focusing on the regulation of magnesium homeostasis in the intestines, kidneys, and bone. [27] I was ecstatic when I read the authors’ assertion that magnesium “is involved in over 600 enzymatic reactions including energy metabolism and protein synthesis.” (I frequently quote magnesium expert Dr. Andrea Rosanoff, who says the number of such reactions is more likely between 700 and 800. At any rate, we have certainly come a long way from the first reports in 1968 that magnesium is responsible for 325 enzymatic reactions in the body.) [28]

The investigators cover the depletion of magnesium due to drugs and the genetic mutations that can produce magnesium deficiency. This is one of the first papers I’ve read that thoroughly discusses mutations in genes that code for magnesium-transporting proteins and describes a dozen hypomagnesemia genes, each with additional dozens of genetic mutations.

Isolating these genes, however, may not be such a good thing. With the recent availability of personal genetic testing, I’m concerned that when allopathic medicine finally “discovers” magnesium deficiency, it will come at the topic through the human genome and blame it on the genes. Medicine has no treatment for genetic hypomagnesemia. It barely knows how to treat hypomagnesemia at all, with recommendations swinging between absurdly high doses of IV magnesium and laxative doses of magnesium oxide.

However, while researchers are busy studying the genetic causes of magnesium deficiency, I’ve found that picometer magnesium does not require magnesium-transporting proteins to bring it to the cells; it doesn’t care if a gene alters your

magnesium requirements. The picometer magnesium ions are stabilized allowing full cellular absorption and assimilation.

“Magnesium in Man” notes that magnesium performs numerous functions that produce, repair, and stabilize DNA and RNA. What if magnesium has the ability to stabilize genes and can prevent mutated gene segments from being turned on? Could therapeutic levels of non-laxative magnesium turn off milder mutations of hypomagnesemia genes?

Will a true genetic defect be treatable with magnesium supplements? A paper in the journal *Gene* began with this statement: “Evidence points to magnesium’s antioxidant, anti-necrotic, and anti-apoptotic effects in cardio-and neuroprotection.” It concludes that “because of the antagonistic effects of Ca^{++} and Mg^{++} ions in the presence of high Ca^{++} ion concentration at MthK [mitochondrion-bound hexokinase], MtCK [mitochondrial creatine kinase], and PTP [mitochondrial permeability transition pore], magnesium supplementation may provide cytoprotective effects in the treatment of some degenerative diseases and cytopathies with high intracellular $[Ca^{++}]/[Mg^{++}]$ ratio at these sites, whether of genetic, developmental, drug induced, ischemic, immune based, toxic, or infectious etiology.” [29]

A 2012 paper called “Magnesium Basics” references several studies proving that ionized magnesium has the greatest biological activity of all forms of the mineral because it most readily enters into cells. [30] Yet doctors mainly recommend magnesium oxide despite the fact that it is only 4 percent absorbed into the bloodstream and that there are no studies indicating how well it is absorbed by the cells. This paper, featuring an eye-popping 595 references, can be printed out and handed to your doctors to help educate them about the importance of magnesium.

Another 2012 paper, this one by Rosanoff and colleagues, is titled “Suboptimal Magnesium Status in the United States: Are the Health Consequences Underestimated?” [31] The answer is a resounding yes!

Rosanoff’s team reports that “low magnesium intakes and blood levels have been associated with type 2 diabetes, metabolic syndrome, elevated C-reactive protein, hypertension, atherosclerotic vascular disease, sudden cardiac death, osteoporosis, migraine headache, asthma, and colon cancer.” They speculate that magnesium deficiency in the cells relates to excess calcium that activates inflammatory cascades separate from injury or infection. They call for more research to define how elevated calcium-to-magnesium ratios influence the inflammatory conditions mentioned in their study.

A 2015 paper, “Magnesium and Dialysis: The Neglected Cation,” confirms that magnesium requirements need to be reevaluated in the treatment of kidney disease and in dialysis patients. [32] The February 2012 issue of *Clinical Kidney Journal* included an extensive paper called “Magnesium in Disease.” [33] I will discuss magnesium and kidney disease and cite these references in more depth in Chapter 11.

A valuable addition to your magnesium education is a free online book from the University of Adelaide called *Magnesium in the Central Nervous System* (2011). [34] I suggest you print out the whole book, or at least several chapters, to present to your doctors to help convince them to give you and your loved ones’ magnesium when you are under their care. Each chapter is a paper written by a magnesium researcher or expert covering important topics involving the central nervous system. The chapter titles

alone show the expanding scope of magnesium research. I've made a list of these chapters in Chapter 5 of my book.

MAGNESIUM REFERENCES

I've updated the scientific citations throughout the 2017 edition of *The Magnesium Miracle* and added several hundred new references, bringing the total to more than 600, proving and confirming the effectiveness of magnesium therapy in a host of diseases: ADHD, anxiety, arthritis, asthma, cancer, cerebral palsy, depression, diabetes, dysmenorrhea, eclampsia, genetic disease, head injury, heart disease, high cholesterol, hypertension, infertility, insomnia, kidney disease, menopause, obesity, osteoporosis, pain, PCOS, preeclampsia, pregnancy, stroke, and syndrome X. So that you can stay current long past the publication date of this book, go to the website of the nonprofit Nutritional Magnesium Association (NMA), www.nutritionalmagnesium.org (I'm on the medical advisory board of the NMA). On that website, you will find all the updated references you and your doctor require to prove the safety and efficacy of magnesium supplementation.

HOW MUCH MAGNESIUM SHOULD I TAKE?

If you do want to do some testing, to prove to your doctor or your family that you are indeed magnesium deficient, I recommend the magnesium RBC blood test. You may repeat it every three to six months, aiming for the optimum value of 6.0–6.5 mg/dL. See Chapter 16 for more on magnesium testing and how to order your own test without a doctor's prescription.

It may take a year or more to build up your magnesium stores in your muscles and bones. However, it usually takes only a few days or a few weeks to notice health improvements, which lets you know you are on the right path. You aren't just looking for symptom relief; it's important to have extra magnesium in reserve for those stressful times that nobody can predict.

Having said that, I must register an official disclaimer that I can't be responsible in cases where people don't follow these important recommendations:

1. Begin taking magnesium slowly, especially if you have a high toxin load, have a chronic disease, or are on many medications.
2. Don't take copious amounts of magnesium without doing proper testing.
3. Be cautious about taking magnesium if you have any of the four contraindications described at the end of this chapter.
4. Along with magnesium, take a multiple-mineral supplement and follow my guidelines for adding sea salt to your drinking water. All of these are necessary to maintain mineral balance.
5. Obtain sufficient calcium (600 mg per day) in your daily diet or use a highly absorbable form of calcium as a supplement.

THE FAIL-SAFE OF MAGNESIUM

Our bodies have a fail-safe mechanism that prevents us from absorbing too much magnesium. If we consume too much magnesium in our diets or from supplements, the body rids itself of the excess by flushing it out through the bowels with diarrhea. This built-in fail-safe makes magnesium, in my opinion, one of the safest nutrients you can take.

This fail-safe was created during our evolution in a culture living near the ocean where most of humanity survived on produce from the sea. Sea water has three times more magnesium than calcium. So, the primitive diet was high in magnesium-rich foods (seaweed, fish, and shellfish), and low in calcium. Thus, it became important to eliminate too much magnesium via the bowels but grab on to as much calcium as possible via vitamin D.

In current times, we are eating high-calcium foods and calcium-fortified foods, and we're taking far more calcium supplementation than magnesium. We also take high doses of vitamin D, which holds on to calcium, to our detriment. Read more about vitamin D in the section "High-Dose Vitamin D Depletes Magnesium" in Chapter 1.

WHO IS DEFICIENT?

The questions I'm most frequently asked about magnesium are "How do I know if I need more magnesium?" and "Should I take magnesium supplements?" I have come to the conclusion that everyone could benefit from magnesium supplementation. You can find out if you are magnesium deficient by identifying your magnesium deficiency symptoms and/or having your blood tested. I talk about the three magnesium blood tests in Chapter 16 of my book. However, a blood test and your clinical symptoms together, or your clinical symptoms alone, can give you your answer.

SIXTY-FIVE CONDITIONS ASSOCIATED WITH MAGNESIUM DEFICIENCY

In the introduction to the first edition of *The Magnesium Miracle*, I listed twenty-one conditions that have a direct clinical correlation with magnesium deficiency and respond to magnesium supplementation. From more recent magnesium research and clinical experience, I've expanded this list to sixty-five conditions. What follows is an overview of these conditions, some of which I develop more fully in the 2017 edition of *The Magnesium Miracle*.

1. **Acid reflux.** Spasm of the lower esophageal sphincter at the juncture of the stomach can leave the sphincter open, causing acid reflux, gastroesophageal reflux disease (GERD), or heartburn. Magnesium relieves esophageal spasms.
2. **Adrenal fatigue.** Adrenal fatigue follows after a time of chronic stress, anxiety, and panic attacks, and it seems to be occurring in epidemic proportions in recent years. Adrenaline, noradrenaline, and cortisol (elevated in chronic stress) deplete magnesium. Stress causes excess elimination of magnesium through the urine, further compounding magnesium deficiency. "Stress" is such an overworked word, but we all suffer physical, emotional, and mental stress every day, and every bit of it drains magnesium.
3. **Alzheimer's disease.** Magnesium blocks the neuroinflammation caused by the inappropriate deposition of calcium and other heavy metals in brain cells. Magnesium

is at work even before the inflammation appears, guarding cell ion channels and not allowing heavy metals to enter. Picometer, stabilized ionic magnesium (such as the ones found in ReMag Magnesium Solution) easily enters cells and can help eliminate heavy metals and solubilize calcium.

4. **Angina.** The pain of angina is caused by severe spasms in heart muscles, which are caused by magnesium deficiency. The heart ventricles have the highest levels of magnesium in the whole body; this is why magnesium is so important for the pumping function of the heart.
5. **Anxiety and panic attacks.** When the adrenals are no longer protected by sufficient magnesium, the fight-or-flight hormones adrenaline and noradrenaline become more easily triggered. When they surge erratically, they cause rapid pulse, high blood pressure, and heart palpitations. The more magnesium-deficient you are, the more exaggerated is the adrenaline response. Magnesium calms the nervous system, relaxes muscle tension, and lowers the pulse rate, helping to reduce anxiety and panic attacks.
6. **Arthritis.** Magnesium can help dissolve calcium that builds up in joint spaces. It also can treat the pain and inflammation of arthritis as a safe substitute for pain medication.
7. **Asthma.** Histamine production and bronchial spasms (in the smooth muscles of the bronchial tract) both increase as a result magnesium deficiency.
8. **Atherosclerosis with calcium deposits.** Magnesium is necessary to help dissolve calcium and keep it soluble in the bloodstream. Magnesium, along with vitamin K2, helps direct calcium to the bones, where it belongs.
9. **Blood clots.** Magnesium does not act like a blood-thinning drug. Instead, it prevents the calcium buildup that triggers clots. Magnesium naturally balances the clotting factors in the blood.
10. **Bowel disease.** Magnesium deficiency slows down bowel peristalsis, causing constipation, which can lead to toxicity as well as symptoms of colitis, microscopic colitis, IBS, diverticulitis, and Crohn's disease.
11. **Brain dysfunction.** You can obtain a free copy of the 355-page book *Magnesium in the Central Nervous System* (2011) online and read an extensive overview of the beneficial effects of magnesium on the brain. [35] (See Chapter 5 for a list of chapters in that book.)
12. **Bruxism (teeth grinding).** Up to 80 percent of cases of bruxism occur during sleep, and your dentist may be the first to notice that your teeth are being gradually worn down. Bruxism is related to clenching of the jaw muscles during the day and is usually associated with stress or anxiety. Any muscle tension can be the result of magnesium deficiency.
13. **Cholesterol elevation.** When I was in medical school in the mid-1970s, normal cholesterol levels were considered to be around 245 mg/dL. In the first edition of *The Magnesium Miracle* I reported allopathic medicine's "normal" value of cholesterol at 180–220 mg/dL. Now doctors are advising that cholesterol should be below 200 mg/dL (5.2 mmol/L) to be considered normal. What doctors don't seem to know is that magnesium, bound to ATP (Mg²⁺-ATP), is the controlling factor for the rate-limiting enzyme in the cholesterol biosynthesis sequence that is targeted by the statin pharmaceutical drugs. [36] Thus magnesium is responsible for naturally slowing

down HMG-CoA reductase activity when cholesterol is present in sufficient quantities. To repeat, this is the same enzyme that statin drugs target for destruction, while creating magnesium deficiency.

14. **Chronic fatigue syndrome (CFS).** I write about CFS in Chapter 12. It is remarkable how magnesium, especially ReMag, can help people increase their energy and get back on track. We still don't know what causes CFS, but in my discussion about the interaction between calcium and magnesium, I consider whether calcium excess and magnesium deficiency could be the underlying cause of mitochondrial dysfunction that many natural medicine practitioners say can trigger chronic fatigue syndrome and other chronic diseases.
15. **Cystitis.** Magnesium deficiency causes bladder spasms, which can cause urinary frequency often misinterpreted as a bladder infection. Magnesium deficiency can also allow calcium to build up in the lining of the bladder and urethra, causing irritation that mimics cystitis. We've had reports from elderly women who have thrown away their adult diapers because, apparently, ReMag dissolves bladder tissue calcification and eliminates incontinence.
16. **Depression.** Serotonin, a neurotransmitter that elevates mood, depends on magnesium for its production and function, whether it's made in the brain or in the intestines. Dopamine, a neurotransmitter that helps control the brain's reward and pleasure centers, utilizes magnesium in several steps in its biochemical pathway. A magnesium-deficient brain is also more susceptible to allergens and foreign substances, which in some instances can cause symptoms similar to mental illness.
17. **Detoxification.** Magnesium is crucial for the removal of toxic substances and heavy metals such as mercury, aluminum, and lead from the cells. Magnesium is a cofactor in both the production of glutathione and the function of the P450 detoxification pathways in the liver.
18. **Diabetes.** Magnesium is necessary to make and secrete insulin, facilitates carbohydrate metabolism, and allows insulin to transfer glucose into cells. Otherwise, glucose and insulin build up in the blood, causing various types of tissue damage. Tyrosine kinase, an enzyme that allows glucose entry into the cell (along with insulin), is magnesium dependent. Seven of the ten enzymes needed to metabolize glucose in the process called glycolysis are also magnesium dependent. All these factors mean that magnesium helps to overcome insulin resistance.
19. **Fatigue.** Magnesium-deficient patients commonly experience fatigue because hundreds of enzyme systems are underfunctioning. The most important factor in energy production is ATP, which must be bound to a magnesium ion in order to be biologically active. Mg^{2+} -ATP is produced in the Krebs cycle, which requires magnesium in six of its eight steps. The Krebs cycle begins by using pyruvate from the glycolysis cycle and functions exclusively in the mitochondria.
20. **Headaches.** Muscle tension and spasms in neck and head muscles can be alleviated with magnesium therapy. Magnesium can be either applied locally or taken orally.
21. **Heart disease.** The heart, specifically the left ventricle, has the highest amount of magnesium in the whole body. Magnesium deficiency is common in people with heart disease, and taking magnesium can reduce that risk. IV magnesium can

prevent heart muscle damage and cardiac arrhythmia if given at the onset of a heart attack. Most drugs used in treating heart disease drain magnesium from the body.

22. **Hypertension.** With insufficient magnesium and too much calcium, the smooth muscles lining blood vessels can go into spasm and cause high blood pressure. If cholesterol is elevated, which can also be due to magnesium deficiency, cholesterol can bind with calcium, causing atherosclerosis in the blood vessels and worsening high blood pressure.
23. **Hypoglycemia.** Magnesium regulates the production of insulin so that inappropriately large amounts aren't released, which would cause the blood sugar to drop suddenly, resulting in symptoms of low blood sugar.
24. **Indigestion.** The gastric proton pump that acidifies the contents of the stomach for proper digestion is dependent on magnesium.
25. **Inflammation.** Most drug companies are now embracing inflammation and not cholesterol as the cause of heart disease. They don't know what causes inflammation, but that doesn't stop them from producing drugs to suppress it. Drug companies don't acknowledge that calcium is extremely proinflammatory and magnesium is very anti-inflammatory. The entire inflammatory cascade (which involves substance P, interleukins, tumor necrosis factor, chemokines, and cytokines) escalates when magnesium is deficient. [37] The bottom line is that inflammation is triggered by magnesium deficiency and relative calcium excess.
26. **Insomnia.** Magnesium relieves the muscle tension that can prevent restful sleep. Also, sleep-regulating melatonin pathway production is disturbed without sufficient magnesium. Magnesium is so effective as a sleep aid that if someone is taking magnesium and their sleep is not improved, I say, "Take more magnesium."
27. **Irritable bowel syndrome.** In my book *IBS for Dummies*, I describe the importance of magnesium in the treatment of pain and spasm in IBS. [38]
28. **Kidney disease.** Magnesium deficiency contributes to atherosclerotic kidney failure because calcium builds up in the renal (kidney) arteries. Magnesium deficiency leads to abnormal lipid levels and worsening blood sugar control in kidney transplant patients. It's important for kidney patients to receive picometer, stabilized ionic magnesium that is absorbed directly into cells and therefore does not build up in the blood to cause electrolyte imbalance and rhythm disturbances.
29. **Kidney stones.** See Chapter 11 for evidence of magnesium's ability to prevent and treat kidney stones, especially when combined with its partner, vitamin B6.
30. **Migraine.** Deficiency of serotonin can result in migraine headaches and depression. Serotonin depends on magnesium for proper balance. Also, tiny blood clots can block capillaries in the brain, leading to migraines. Magnesium prevents calcium from causing inappropriate blood clotting. It is well known that IV and oral magnesium can treat and prevent migraine headaches.
31. **Musculoskeletal conditions.** Insufficient magnesium and the relative excess of calcium will cause sustained muscle contraction in any muscle group in the body. The following musculoskeletal conditions are amenable to magnesium therapy:
 32. Muscle cramps or Muscle spasms in any muscle of the body
 33. Fibrositis
 34. Fibromyalgia

- 35. GI spasms (chronic pain from undiagnosed spasms can lead to inappropriate exploratory surgery)
- 36. Tension headaches
- 37. Chronic neck and back pain
- 38. Jaw tension
- 39. **Nerve problems: neuralgia, neuritis, neuropathy.** Insufficient magnesium and the relative excess of calcium will cause sustained nerve excitation in any nerve cells in the body. Magnesium alleviates the following nerve disturbances that can occur:
 - 40. Burning pain, pins and needles, tingling
 - 41. Muscle weakness
 - 42. Numbness
 - 43. Paralysis
 - 44. Seizures and convulsions
 - 45. Skin sensitivity
 - 46. Twitching
 - 47. Vertigo
 - 48. Confusion
- 49. **Obstetrical and gynecological problems.** Magnesium helps prevent or treat the following:
 - 50. Premenstrual syndrome
 - 51. Dysmenorrhea (cramping pain during menses)
 - 52. Female infertility (by relieving fallopian tube spasm)
 - 53. Premature contractions (which can be triggered by magnesium-deficiency muscle spasms)
 - 54. Preeclampsia and eclampsia in pregnancy (fluid retention, high blood pressure, and seizures)
 - 55. Cerebral palsy
 - 56. Sudden infant death syndrome (SIDS)
 - 57. Male infertility (magnesium and zinc are present in significant quantities in healthy semen)
- 58. **Osteoporosis.** Low magnesium in the presence of elevated calcium, with or without vitamin D, triggers a cascade of events leading to bone loss.
- 59. **Parkinson's disease.** Dopamine deficiency results in Parkinson's disease, and magnesium is a required cofactor in the production of dopamine. Magnesium blocks the neuroinflammation caused by calcium deposits in the brain.
- 60. **Raynaud's syndrome.** Magnesium helps relax the spastic blood vessels that cause pain and numbness of the fingers.
- 61. **Sports injuries.** Pain, inflammation, muscle spasm, muscle tension, and scarring can all be treated with magnesium.
- 62. **Sports recovery.** Magnesium reduces lactic acid buildup and replaces loss of magnesium in sweat, which otherwise can result in post-exercise pain.
- 63. **Temporomandibular joint syndrome (TMJ).** This hinge joint connects the jawbone to the cheekbone. The joint can become irritated and inflamed due to arthritis, excessive gum chewing, injury to the teeth or jaw, misalignment of the teeth or jaw, poor posture, stress, and teeth grinding. Most of these factors are aggravated by magnesium deficiency.

64. **Tongue biting.** In a magnesium-deficient person, the muscles of the tongue and the muscles lining the inside of the mouth can go into spasm while the person is eating, causing the teeth to suddenly and inadvertently clamp down on the tongue or the lining of the inside of the mouth.
65. **Tooth decay.** Magnesium deficiency causes an unhealthy balance of phosphorus and calcium in saliva, which damages the teeth.

If you tell me you are taking magnesium and are still having magnesium deficiency symptoms, it usually means you aren't taking enough or you aren't taking the right kind of magnesium. I encourage you to find out if you are absorbing magnesium by ordering a magnesium RBC test.

If your doctor doesn't realize that the above sixty-five conditions can be due to magnesium deficiency and may be resolved with appropriate magnesium supplementation, you will be prescribed drugs. Unfortunately, drugs such as painkillers, diuretics, antibiotics, and cortisone further deplete magnesium and other minerals, allowing symptoms to get completely out of control.

A study conducted by the Mayo Clinic made the headlines with the following sensational title: "Study Shows 70 Percent of Americans Take Prescription Drugs." [39] Based on the prescription records of 147,377 patients, Mayo Clinic researchers found that almost 70 percent of Americans are on at least one prescription drug, and more than 50 percent take two. Twenty percent of patients are on five or more prescription medications, and one in four women between the ages of fifty and sixty-four is on antidepressants.

According to the Centers for Disease Control and Prevention, the percentage of people using at least one prescription drug in the past expenditures, in 2015 the IMS Institute for Healthcare Informatics found that drug spending in the United States had reached \$310 billion annually—that was a 24 percent increase in just six years.

CONTRAINDICATIONS TO MAGNESIUM THERAPY

1. **Kidney failure.** With kidney failure, there is an inability to clear magnesium from the kidneys.
2. **Myasthenia gravis.** Intravenous administration could accentuate muscle relaxation and collapse the respiratory muscles.
3. **Excessively slow heart rate.** Slow heart rates can be made even slower with magnesium, as magnesium relaxes the heart. Very slow heart rates often require an artificial pacemaker.
4. **Bowel obstruction.** The main route of elimination of oral magnesium is through the bowel.

Even with these contraindications, there are many exceptions to the rule. Please read the section called "Kidneys Need Magnesium" in Chapter 11 to help understand how magnesium is actually necessary for kidney health, but I recommend using a picometer, stabilized ionic form.

As for the second contraindication, I have had people with myasthenia gravis tell me that magnesium helped them overcome their disease when it was originally caused by heavy metal poisoning and/or yeast overgrowth.

If someone has an excessively slow heart rate that's not just related to adrenal fatigue or exhaustion, they can benefit from a pacemaker and then be able to take magnesium. I encourage people to get fitted with a pacemaker if it seems medically justified and not avoid it because they are afraid of allopathic medicine. A pacemaker is one of the great benefits of modern medicine.

Someone with bowel obstruction should be hospitalized and not have access to the laxative effects of magnesium, which would just further bloat their intestines.

CLOSING REMARKS

As promised you have received this free chapter of my newest book, *The Magnesium Miracle*, 2017 edition. I am pleased to be able to offer it to you complete with references and hope that you will join me in advocating for magnesium education and proper supplementation. And, as you saw throughout the book – there's lots more to learn! Avail yourself of all my resources on my radio show website and blog – and feel free to purchase the full version of the book on Amazon as well.

Mahalo,

Carolyn Dean MD ND

<http://drcarolyndeanlive.com>

<http://drcarolyndean.com>

References:

1. Crossen C, *Tainted Truth: The Manipulation of Fact*. Simon & Schuster, New York, 1995.
2. Cohn M, "Industry funds six times more clinical trials than feds, research shows." *Baltimore Sun*, Dec. 15, 2015.
3. Teo KK et al., "Effects of intravenous magnesium in suspected acute myocardial infarction: overview of randomized trials." *Brit Med J*, vol. 303, pp. 1499–1503, 1991.
4. Teo KK, Yusuf S, "Role of magnesium in reducing mortality in acute myocardial infarction. A review of the evidence." *Drugs*, vol. 46, pp. 347–359, 1993.
5. Altura BM, "Sudden-death ischemic heart disease and dietary magnesium intake: is the target site coronary vascular smooth muscle?" *Med Hypotheses*, vol. 5, no. 8, pp. 843–848, 1979.
6. Altura BM, "Introduction: Importance of Mg in physiology and medicine and the need for ion selective electrodes." *Scand J Clin Lab Invest Suppl*, vol. 217, pp. 5–9, 1994.
7. Mauskop A, Fox B, *What Your Doctor May Not Tell You About Migraines*. Warner Books, New York, 2001.
8. Mauskop A et al., "Deficiency in serum ionized magnesium but not total magnesium in patients with migraines. Possible role of ICa2/IMg2 ratio." *Headache*, vol. 33, no. 3, pp. 135–138, 1993.
9. Mauskop A et al., "Intravenous magnesium sulphate relieves migraine attacks in patients with low serum ionized magnesium levels: a pilot study." *Clin Sci (Colch)*, vol. 89, no. 6, pp. 633–636, 1995.
10. Seelig MS, "The requirement of magnesium by the normal adult." *Am J Clin Nutr*, vol. 14, pp. 342–390, 1964.
11. Seelig MS, "Cardiovascular reactions to stress intensified by magnesium deficit in consequences of magnesium deficiency on the enhancement of stress reactions; preventive and therapeutic implications: a review." *J Am Coll Nutr*, vol. 13, no. 5, pp. 429–446, 1994.
12. Durlach J, *Magnesium in Clinical Practice*. Libbey, London, 1988.
13. Durlach J, "Diverse applications of magnesium therapy." In *Handbook of Metal-Ligand Interactions in Biological Fluids—Bioinorganic Medicine*, vol. 2, Marcel Dekker, New York, 1995.
14. <http://articles.mercola.com/sites/articles/archive/2003/11/26/death-by-medicine-part-one.aspx>.
15. <http://drcarolyndean.com/natural-health-books-by-dr-dean>.
16. Starfield B, "Is US health really the best in the world?" *JAMA*, vol. 284, no. 4, pp. 483–485, 2000.
17. www.anh-usa.org/stop-codex.
18. Shlezinger M et al., "Desalinated seawater supply and all-cause mortality in hospitalized acute myocardial infarction patients from the Acute Coronary Syndrome Israeli Survey 2002–2013." *Int J Cardiol*, vol. 220, pp. 544–550, 2016.
19. Fox C et al., "Magnesium: its proven and potential clinical significance." *South Med J*, vol. 94, no. 12, pp. 1195–1201, 2001.
20. Grober U, Schmidt J, Kisters K, "Magnesium in prevention and therapy." *Nutrients* vol. 7, no. 9, pp. 8199–8226, 2015.
21. Blaylock RL, *Excitotoxins: The Taste That Kills*. Health Press, Sante Fe, NM, 1997.
22. Volpe SL, "Magnesium in disease prevention and overall health." *Adv Nutr*, vol. 4, no. 3, pp. 378S–383S, 2013.

23. Volpe SL, "Magnesium and the athlete." *Curr Sports Med Rep*, vol. 14, no. 4, pp. 279–283, 2015.
24. Shah NC et al., "Short-term magnesium deficiency downregulates telomerase, upregulates neutral sphingomyelinase and induces oxidative DNA damage in cardiovascular tissues: relevance to atherogenesis, cardiovascular diseases and aging." *Int J Clin Exp Med*, vol. 7, no. 3, pp. 497–514, 2014.
25. Long S, Romani AM, "Role of cellular magnesium in human diseases." *Austin J Nutr Food Sci*, vol. 2, no. 10, 2014.
26. Glasdam SM et al., "The importance of magnesium in the human body: a systematic literature review." *Adv Clin Chem*, vol. 73, pp. 169–193, 2016.
27. de Baaij JHF et al., "Magnesium in man: implications for health and disease," *Physiol Rev*, vol. 95, no. 1, pp. 1–46, 2015.
28. Rosanoff A, "The essential nutrient magnesium—key to mitochondrial atp production and much more." 2009. [www .prohealth .com/ library/ print .cfm ?libid = 14606](http://www.prohealth.com/library/print.cfm?libid=14606).
29. Golshani-Hebroni S, "Mg⁺⁺ requirement for MthK binding, and Mg⁺⁺ stabilization of mitochondrial membranes via activation of MTHK & MtCK and promotion of mitochondrial permeability transition pore closure: a hypothesis on mechanisms underlying Mg⁺⁺'s antioxidant and cytoprotective effects." *Gene*, vol. 581, pp. 1–13, 2015.
30. Jahnen-Dechent W, Ketteler M, "Magnesium basics." *Clin Kidney J*, vol. 5, suppl. 1, pp. i3–i14, 2012.
31. Rosanoff A et al., "Suboptimal magnesium status in the United States: are the health consequences underestimated?" *Nutr Rev*, vol. 70, no. 3, pp. 153–164, 2012.
32. Alhosaini M et al., "Magnesium and dialysis: the neglected cation." *Am J Kidney Dis*, vol. 66, no. 3, pp. 523–531, 2015.
33. Geiger H, Wanner C., "Magnesium in disease." *Clin Kidney J*, vol. 5, suppl. 1, pp. i25–i38, 2012.
34. [www .adelaide .edu .au/ press/ titles/ magnesium](http://www.adelaide.edu.au/press/titles/magnesium).
35. [www .adelaide .edu .au/ press/ titles/ magnesium](http://www.adelaide.edu.au/press/titles/magnesium).
36. Rosanoff A, Seelig MS, "Comparison of mechanism and functional effects of magnesium and statin pharmaceuticals." *J Am Coll Nutr*, vol. 23, no. 5, pp. 501S–505S, 2004.
37. Weglicki WB, Phillips TM, "Pathobiology of magnesium deficiency: a cytokine/neurogenic inflammation hypothesis." *Am J Physiol*, vol. 263, no. 3, part 2, pp. R734–R737, 1992.
38. Dean CFA, Wheeler LC, *IBS for Dummies*. Wiley, Hoboken, NJ, 2005.
39. "Nearly 7 in 10 Americans are on prescription drugs." *Science News*, June 19, 2013.