

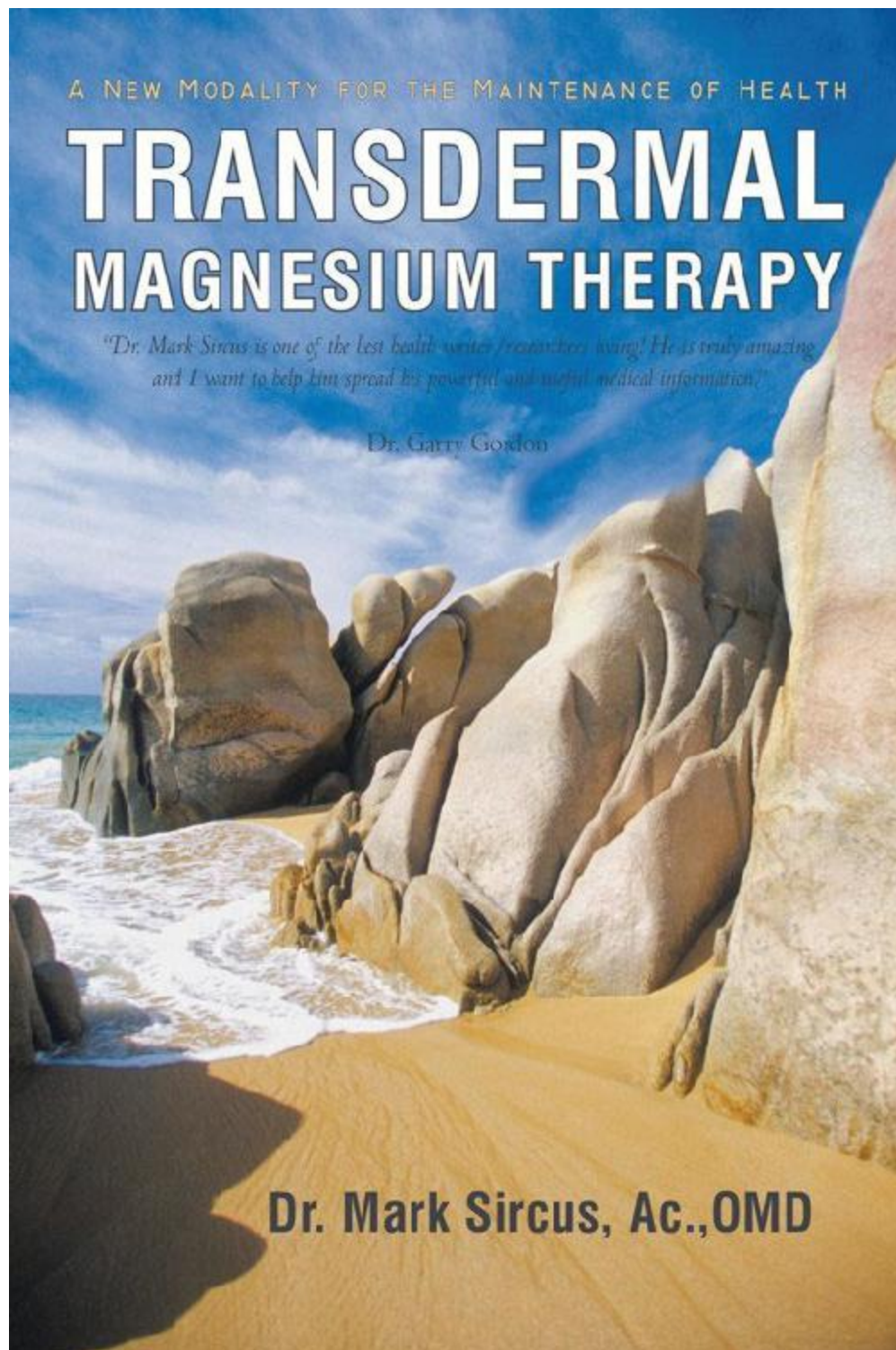
A NEW MODALITY FOR THE MAINTENANCE OF HEALTH

# TRANSDERMAL MAGNESIUM THERAPY

*"Dr. Mark Sircus is one of the best health writers/researchers living." He is truly amazing and I want to help him spread his powerful and useful medical information."*

Dr. Garry Gordon

**Dr. Mark Sircus, Ac., OMD**



## TRANSDERMAL MAGNESIUM THERAPY

A New Modality for the Maintenance of Health Dr. Mark Sircus, Ac., OMD

iUniverse, Inc.

Bloomington

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It is highly regrettable that the deficiency of

such an inexpensive, low-toxicity nutrient results in diseases that cause incalculable suffering and expense throughout the world.

Dr. Steven Johnson

Magnesium is nothing short of a miracle mineral in its healing effect on a wide range of diseases as well as in its ability to rejuvenate the aging body. We know that it is essential for many enzyme reactions, especially in regard to cellular energy production, for the health of the brain and nervous system and also for healthy teeth and bones.

However, it may come as a surprise that in the form of magnesium chloride it is also an impressive infection fighter.

Walter Last

Please read through my sites or E-books for more information.

One can enter my virtual universe at [www.imva.info](http://www.imva.info) Table of Contents

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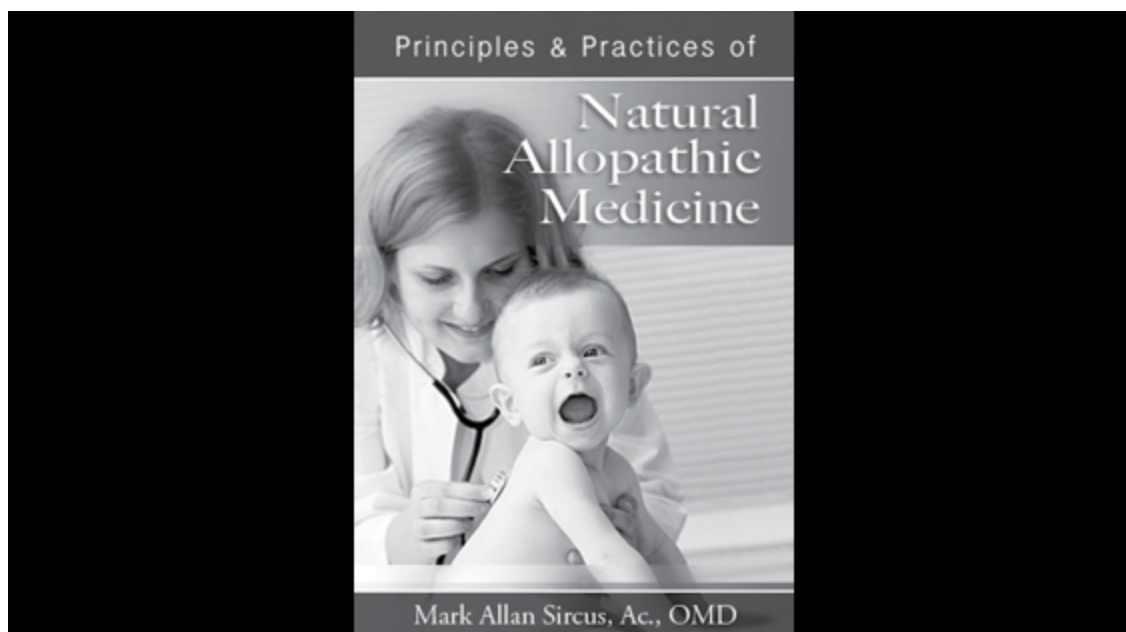
# Introduction to the 2 nd Edition

The book that you hold in your hands could save your life. It certainly contains information that can extend your physical existence and save you and your loved ones from a considerable amount of pain and even economic hardship. Magnesium is the “lamp of life” and one of the most important keys to overall health.

When applied in the correct way magnesium offers us a return to strength and vigor and is useful in a medical sense in more ways than we can possibly imagine.

This is the first in a series of books on a new form of medicine called natural allopathic medicine—an approach that uses common emergency room medicines for chronic diseases. Natural allopathic medicine employs substances like sodium bicarbonate, magnesium chloride and iodine in their natural forms. All three are concentrated nutritional agents that are much safer, more economical and more effective than pharmaceuticals, all of which come with a long list of side effects that can be debilitating, deadly, and drive down precious magnesium stores even further.

Most doctors and patients think of magnesium chloride as a medicine that can be injected while you are having a heart attack, and it does save the day for both heart and stroke patients if used quickly enough. What you will be introduced to in this book is “magnesium oil,” a natural concentrated form of magnesium chloride that can be applied directly to the skin for intense effect.



All the above-mentioned emergency room workhorse medicines can be taken orally, applied transdermally, injected, nebulized directly into the lungs, diluted, and used as eye, nose and eardrops. They can also be used in douches and enemas and even put into baths for luxurious, comfortable and relaxing treatments. These powerful healing substances are indispensable to every healthcare practitioner as well as patients who are looking for safe evidence-based scientific medicines with long histories of effective use.

Though oral magnesium supplementation and intravenous administration have been the prevalent forms used in the 20<sup>th</sup> century, this book introduces the transdermal approach, which opens the door for magnesium to be used as a universal medicine.

One cannot take a high enough dosage orally, and injections are costly and sometimes uncomfortable though absolutely the best method in emergency situations. My favorite way is to combine oral and transdermal administration approaches to bring magnesium cell levels back to their full levels as quickly as possible.

Magnesium (Mg), repleted back to normal metabolic levels, will help our patients and ourselves get to sleep if insomnia is an issue, increase our energy levels and performance in sports if we are an athlete, and help us



avoid the major plagues of our time: diabetes, cancer, heart disease, neurological disorders (MS/

Alzheimer's, etc.), and strokes. If we do not succumb to one of these diseases our lives are extended. Magnesium supplementation makes surgery safer and helps avoid birth complications.

With magnesium we can alleviate a score of common problems like muscle pain, insomnia, migraines, menstrual pain, and depression.

We can activate vital enzyme processes and ATP production to increase energy levels because magnesium is as much of a food to the body as wheat, rice, or any meat. One can prevent cancer, treat and cure diabetes, and help children recover from autism

when magnesium chloride is appropriately used both transdermally and orally.

This book represents a great medical discovery and it started in July of 2005 when I made a momentous phone call to Daniel Reid, the author of *The Tao of Detox*, in Australia. I called to ask him about magnesium oil (magnesium chloride), a product that was applied directly onto the skin or put in one's bath. His reply was simple, "It's the best detoxification agent I know of." At that time of the writing of the first edition of *Transdermal Magnesium Therapy*, only Dr. Norman Shealy was talking about how it could be used this way.

It is now four years later and this second edition will take you on a sweeping journey. This edition offers a deeper understanding of magnesium medicine and it sustains the importance and position of magnesium chloride as the number-one heavyweight medicinal in the medical world.

Magnesium chloride is a potent mineral medicine and it is safe and incredibly fast acting. This book calls on all doctors, dentists, naturopaths, chiropractors, nurses, acupuncturists, and other professional healthcare practitioners to open up to the discovery of how magnesium chloride can most effectively be applied. I frequently quote Dr. Carolyn Dean who wrote *The Miracle of Magnesium*. Her title was well chosen. Magnesium,

especially when applied transdermally, is the medical miracle we have been waiting for. It is the first medicine that should be stocked in medical cabinets and is the safest, most effective medicine we can recommend and use with patients.

When I wrote the first edition I had not yet done my research on iodine and sodium bicarbonate. Now one has to read my books on these other medicines to fully understand my work. Magnesium, iodine, and bicarbonate (plus selenium, vitamins C and D, alpha lipoic acid, spirulina, clay, probiotics, and good water) offer a grouping of substances that can be forged into a universal protocol that goes a long way in helping us resolve the most difficult chronic syndromes we face today, including cancer and diabetes.

When using iodine and sodium bicarbonate with magnesium chloride we can take on just about any infection and actually do more than prevent cancer—we can treat it. These three substances are at the heart of my cancer protocol, or what I call “Natural Chemotherapy”. And they comprise the nuclear center of my

“Natural Emergency Medicine” that can bring a person back to life even if they are knocking on death’s door.

One of the new chapters in this second edition, called “Magnesium Bicarbonate,” shows, on the level of basic human physiology, how indispensable substances like magnesium and bicarbonate combine synergistically to help each other improve conditions all the way down to the level of mitochondrial function.

Magnesium chloride is absolutely necessary for life and health but we find that it is grossly deficient in the majority of people who exist on contemporary diets. The clinical situation is so bad that when it comes to magnesium, people with chronic diseases can be sure, with no test needed, that their magnesium levels will be low. This means that they will respond exceptionally well to treatments with magnesium chloride with a minimum of contraindications.

In our age of toxicity, where we are all being poisoned by the chemicals in the air we breathe, the water we drink, the foods we eat, the surfaces we touch, and the medicines we take, we need more, not fewer, critical nutritional agents to help us detoxify our bodies and maintain our health.

Magnesium Medicine is Nutritional Medicine The use of magnesium chloride is the practice of concentrated nutritional medicine. It's the process of taking a nutritional element in dosages not possible with dietary intake. When Hippocrates said in 400 B.C., "Let thy food be thy medicine," he did not dream that individual vitamins, minerals and even enzymes could be taken in concentrated form. Twenty-five hundred years later we find that emergency room and intensive care doctors are practicing concentrated nutritional medicine to save lives every day.

## Foreword

In this age of high tech mechanical medicine and modern chemical pharmaceuticals, the simple basic "facts of life" regarding human health and healing are all too often overlooked and forgotten.

For those who are dedicated to the pursuit of real health and true healing, it is a cause for celebration when one of these simple basic facts is rediscovered and brought back into the light. One of the most important of these revelations in recent years is the essential role played by magnesium in almost all of the fundamental equations of human health.

The Chinese ideogram for magnesium consists of the symbols for

"mineral" and "beautiful"—hence it was known to traditional healers in China as "mei," the beautiful mineral, and its importance in both preventive healthcare and curative therapeutics was clearly recognized. Following the guideline that food is always the best medicine, particularly in the prevention of disease and degeneration, the traditional Chinese diet contained abundant supplies of this vital mineral.

In the Western world today, particularly in America, heart disease has become one of the primary causes of premature death, and magnesium

deficiency has been conclusively proven to be a major factor in all cases of heart failure. With approximately 80

percent of the population critically deficient in magnesium, it's

a small wonder that heart disease has become one of the biggest killers.

But it's not only the human heart that depends on adequate supplies of magnesium. Immune response, nerve and brain functions, blood pressure, and more than 300 essential enzymatic reactions in the cells of the human body all rely on magnesium.

Without adequate magnesium, many of the body's vital functions grind to a halt. Unfortunately, most magnesium supplements on the market today are useless for two reasons: first, they're made from the wrong form of magnesium; second, oral supplementation of magnesium is not very effective because of low bowel tolerance and low levels of absorption.

The form of magnesium that the human metabolic system recognizes and assimilates most readily is magnesium chloride, the same form contained in seawater, but very few nutritional supplements on the market today include this type of magnesium. And the simple secret to the proper administration and optimum assimilation of magnesium is to apply it transdermally, i.e., via the skin, instead of just orally.

Transdermal administration of magnesium is a quick and easy way to correct chronic degenerative conditions caused by magnesium deficiency, and the simplest way to do this is to spray the surface of the skin with a solution of magnesium chloride, or to soak the feet for 20 minutes in a bucket of hot water with a minimum of a few ounces of magnesium chloride fluid added to it.

In the integrated detoxification and regeneration healing program that my wife Snow and I offer each year at health resorts in Asia, transdermal magnesium therapy plays a key role in the form of a soothing hot bath which we refer to as a "magnum bath." We call our program "Renew Your Lease on Life," and the efficacy of transdermal magnesium chloride therapy

for tissue detoxification and cellular regeneration has been proven time and again in this program.

In this book, Dr. Mark Sircus has collected together the full spectrum of essential information regarding the benefits of magnesium for human health and its practical therapeutic applications in healing. This is a book which should become required reading for all aspiring naturopathic health professionals, as well as for doctors of conventional modern medicine who are beginning to wonder why the pharmaceutical drugs they've been taught to prescribe for virtually every acute and chronic condition today not only fail to cure their patients, but often cause disastrous side effects that lead to even worse conditions. It's also a book that anyone who wants to protect their own health as well as that of their family should have on the bookshelf at home.

Daniel Reid

Byron Bay, Australia

December 2009

## 1. The Power of Magnesium

There is no healing system more powerful than that which employs Nature's primordial substances—materials so pure and close to nature that they yield benefits without the typical side effects of most drugs. The secret to safe and effective medicine is found in using medicinal substances that do not have side effects in reasonable doses. This is the very meaning of safe— something that will not harm or hurt you.

I received a letter from a professional colleague named George Eby in 2007 that stated that his daughter had been destroyed by the terrible side effects of a special type of antibiotic called fluoroquinolones (Cipro). He said, "My daughter was stricken with this horrible affliction. Cipro sensitivity causes long-term (multiple years to life) chronic pain, muscle weakness, and tendon weakness leading to tendon breakage and many other horrible effects, some physical and some mental. This is something that everyone needs to know about. We have been destroyed by Cipro. I don't think there

is much anyone can do except to give her magnesium, which is somewhat of an antidote. I am very worried but I haven't lost hope, yet I am being realistic. Some of the tendon damage is necrotic and permanent.

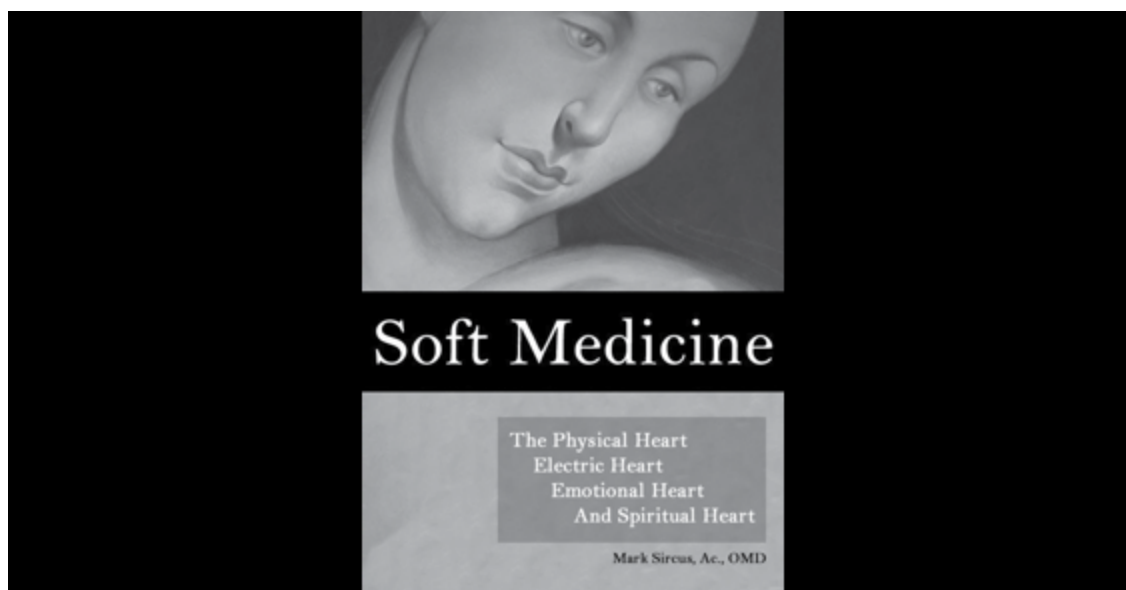
However, we have studies with rattlesnake venom that produce necrosis on animals and simply applying magnesium (chloride) and zinc (gluconate) topically, the necrosis vanishes." Ten days later I received an email from George saying:

"Topical magnesium chloride for 10 days = well daughter!"

There is a power and a force in magnesium chloride that cannot be equaled anywhere else in the world of medicine. There is no substitute for magnesium in human physiology; nothing comes even close to it in terms of its effect on overall cell physiology. It is negligent to ignore magnesium chloride in the treatment of any chronic or acute disorder.

### The Heavy Guns of Magnesium

In the emergency room, medicines have to be safe while delivering an instant life-saving burst of healing power. Magnesium is the heavyweight champion in this regard though there is ignorance about this. It's like medical hypnosis: doctors cannot see what is in front of their very eyes. They have a medical super weapon that no one can make much money off of, so it's not supported in the literature or in medical schools. In the area of magnesium research there are mountain ranges of scientists who have penetrated magnesium's secrets. There are 600 references in this book, the majority linking to original medical research.



Magnesium is lifesaving, and that is a power practitioners and patients want to tap into. Magnesium has the power to reduce human suffering in a wide variety of clinical situations.

Obviously if a medicine is safe enough and strong enough for emergency situations it is going to help us with chronic diseases. Modern medicine, however, has avoided this insight.

Magnesium chloride is truly astounding in terms of safety, low cost, and proven effectiveness.

In this book you will find many amazing applications for the use of magnesium chloride. For instance results of a 10-year study published in the August 28, 2008 issue of the New England Journal of Medicine found that magnesium administered to women delivering before 32 weeks of gestation reduced the risk of cerebral palsy by 50 percent. <sup>1</sup> The Beneficial Effects of Antenatal Magnesium (BEAM) trial was conducted in 18 centers in the U.S., including Northwestern Memorial, and is the first prenatal intervention ever found to reduce the instance of cerebral palsy related to premature birth. Magnesium sulfate and magnesium chloride are used in obstetrics to stop premature labor and prevent seizures in women with hypertension.

When I personally used magnesium chloride treatments for sports reasons, I used upward of two ounces each day for immediate pain relief and muscle relaxation. I would have one of my staff massage it onto my body for the most heavenly medical treatment imaginable. Magnesium massage is one of my most recommended treatments for people with cancer, combining the power of magnesium with what I call “Therapeutic Healing Touch.” (See my e-book *Soft Medicine*.)

There is no substitute for magnesium; it’s as close as a metal comes to being as necessary as air.

Magnesium is nearly miraculous for the depth and scope of its application. It really is not an exaggeration to say that miracles in medicine would be achieved if people’s magnesium deficiency were addressed instead of ignored. Certainly many lives would be saved if non-toxic medicines were favored over toxic ones. This is not idle medical banter and the entire medical community will eventually have to reorient itself by putting magnesium, specifically magnesium chloride, at the top of the chart of usable medicines that most patients need quite desperately.

When 1,033 hospitalized patients were studied, over 54 percent were low in magnesium. What was worse was that 90 percent of the doctors never even thought of ordering a magnesium test. <sup>2</sup>

Journal of the AMA

Despite the fact that magnesium is almost as important for life as the air we breathe, it seems like the medical industrial complex is not too keen on the public getting enough of this precious mineral. For instance, for the past 15 years evidence has stacked up showing patients with acute coronary thrombosis improve their survival chances by 50-82.5 percent when given intravenous magnesium of 32-66 mmol (1200 milligrams of magnesium equals 50 mmol) in the first 24 hours, <sup>3</sup> and still magnesium chloride or magnesium sulfate are not used universally in hospitals around the world. Rapid intravenous doses of magnesium have been shown to instantaneously and effectively dilate the coronary collateral circulation, proving to be a dramatically effective treatment of acute myocardial infarction, angina, and

20



congestive heart failure. 74

Magnesium is the most important

20

mineral to man and all living organisms. 75

Dr. Jerry Aikawa

The medical authorities and certainly the pharmaceutical companies are in a pickle with magnesium chloride. They have a powerful medicine that is non-toxic, inexpensive, and effective in a wide variety of medical situations. So what do they do? They have a study designed to show the opposite, thus sabotaging medical clarity on the use of a valuable and safe medicine.

Specifically, a single negative study showing that magnesium had a worsening effect on survival employed a far higher dose of 20

magnesium (80 mmol) than the studies mentioned above, 76 and another study, showing no benefit with magnesium, employed the low dose of 10 mmol in the first 24 hours.

## 1. Magnesium, the Lamp of Life

Inside chlorophyll is the lamp of

life and that lamp is magnesium.

The capture of light energy from the sun is magnesium-dependent.

Magnesium is bound as the central atom of the porphyrin ring of the green plant pigment chlorophyll. Magnesium is the element that causes plants to be able to convert light into energy and chlorophyll is identical to hemoglobin except the magnesium atom at the center has been taken out and iron put in. The whole basis of life and the food chain is seen in the sunlight-chlorophyll-magnesium chain. Since animals and humans obtain

their food supply by eating plants, magnesium can be said to be the source of life for it is at the heart of chlorophyll and the process of photosynthesis.

A huge step forward for early life was the development of chlorophyll, a molecule that captures light energy from the sun in a process called photosynthesis. Chlorophyll systems convert energy from visible light into small energy-rich molecules easy for cells to use. The harnessing of the energy of visible light led to a vast expansion of early life forms. Fossilized layers, three and a half billion years old, have been found with evidence of blue-green algae that lived on top of tidal rocks.

Chlorophyll with its magnesium core is recognized as one of nature's richest sources of important nutrients where its rich green pigment is vital for the body's rapid assimilation of amino acids and for the synthesis of enzymes.

Magnesium is needed by plants to form chlorophyll, which is the substance that makes plants green. Without magnesium sitting inside the heart of chlorophyll, plants would not be able to take nutrition from the sun because the process of photosynthesis would not go on. When magnesium is deficient things begin to die.

In reality we cannot take a breath, move a muscle, or think a thought without enough magnesium in our cells. Because magnesium is contained in chlorophyll, it is considered an essential plant mineral salt.

Without chlorophyll, plants are unable

to convert sunlight and carbon dioxide.

There is no life without magnesium.

Magnesium is a necessary element for all living organisms both animal and plant. Chlorophyll is structured around a magnesium atom, while in animals magnesium is a key component of cells, bones, tissues and just about every physiological process you can think of. Magnesium is primarily an intracellular cation; roughly one percent of whole-body magnesium is found

extracellularly, and the free intracellular fraction is the portion regulating enzyme

pathways inside the cells. Life packs the magnesium jealously into the cells; every drop of it is precious.

### The Sun—Magnesium—Vitamin D

After discovering how important magnesium is in capturing the sun's energy, it should not be surprising to find out that the body cannot use vitamin D as efficiently in a magnesium-deficient body. Magnesium facilitates the release of calcium from bone in 20

the presence of adequate amounts of vitamin D and parathormone. 77

Standard textbooks state that the principal function of vitamin D

is to promote calcium absorption in the gut and calcium transfer across cell membranes, thus contributing to strong bones and a calm, contented nervous system. It is also well recognized that vitamin D aids in the absorption of magnesium, iron, and zinc, as well as calcium.

Disorders in which magnesium depletion is common have an associated higher incidence of osteoporosis. Magnesium depletion in humans results in hypocalcemia, low serum parathyroid hormone (PTH), and 1,25(OH)<sub>2</sub> vitamin D levels, as well as PTH and vitamin D resistance, which may serve as mechanisms for the development 20

of osteoporosis. 78

### Magnesium & DNA

Magnesium ions play critical roles in many aspects of cellular metabolism. Magnesium stabilizes structures of proteins, nucleic acids, and cell membranes by binding to the macromolecule's surface and promotes specific structural or catalytic activities of proteins, enzymes, or ribozymes. Magnesium has a critical role in cell division. It has been suggested that

magnesium is necessary for the maintenance of an adequate supply of nucleotides for the synthesis of RNA and DNA.

Magnesium plays a critical role in vital DNA repair proteins.

Magnesium ions synergetic effects on the active site geometry may affect the polymerase closing/opening trends.

Single-stranded RNA are stabilized by magnesium ions.

Distinct structural features of DNA, such as the curvature of dA tracts important in the recognition, packaging, and regulation of DNA, are magnesium-dependent. Physiologically relevant concentrations of magnesium have been found to enhance the curvature of dA tract DNAs . The chemistry of water activated by a magnesium ion is central to the function of the DNA repair proteins, apurinic/apyrimidic endonuclease 1 (Ape1) and polymerase A (Pol A). These proteins are key constituents of the base excision repair (BER) pathway, a process that plays a critical role in preventing the cytotoxic and mutagenic effects 20

of most spontaneous, alkylation, and oxidative DNA damage. 79

Magnesium ions help guide polymerase selection for the correct nucleotide extends 20

descriptions of polymerase pathways. <sup>170</sup>

DNA-polymerase is considered to be a holoenzyme since it requires a magnesium ion as a co-factor to function properly . DNA-polymerase initiates DNA replication by binding to a piece of single-stranded DNA. This process corrects mistakes in newly synthesized DNA.

DHEA—Magnesium—Cholesterol

Low levels of DHEA are associated with loss of “pathology,”

preventing signaling between immune system cells. <sup>11</sup>

Dr. James Michael Howard says, “Cancer and infections are both increasing and one of the basic reasons is reduced availability of DHEA, which stems from magnesium deficiency .” Also known as

“mother of all steroid hormones” DHEA is converted in the body into several different hormones, including estrogen and testosterone. DHEA appears to restore immune balance and stimulate monocyte production (the cells that attack tumors), B-cell activity (the cells that fight disease-causing organisms), T-cell mobilization (infection-fighting T-cells have DHEA binding sites), and protection of the thymus gland (which produces T-cells).<sup>12</sup> The data suggest that DHEA has a role in the neuroendocrine regulation of the antibacterial immune resistance.<sup>13</sup>

All steroid hormones are created from cholesterol in a hormonal cascade. Cholesterol, that most maligned compound, is actually crucial for health and is the mother of hormones from the adrenal cortex, including cortisone, hydrocortisone, aldosterone, and DHEA. Cholesterol cannot be synthesized without magnesium and cholesterol is a vital component of many hormones. These hormones are interrelated, each performing a unique biological function with them all depending on magnesium for their function.

Interestingly, aldosterone needs magnesium to be produced and it<sup>20</sup> also regulates magnesium’s balance.<sup>174</sup>

Dr. Mildred S. Seelig wrote, “Mg<sup>2+</sup>-ATP is the controlling factor for the rate-limiting enzyme in the cholesterol biosynthesis sequence that is targeted by the statin pharmaceutical drugs; comparison of the effects of Mg<sup>2+</sup> on lipoproteins with those of the statin drugs is warranted. Formation of cholesterol in blood as well as of cholesterol required in hormone synthesis and membrane maintenance is achieved in a series of enzymatic reactions that convert HMG-CoA to cholesterol. The rate-limiting reaction of this pathway is the enzymatic conversion of HMG CoA to mevalonate via HMG CoA. The statins and magnesium inhibit that enzyme. Magnesium has effects that parallel those of statins. For example, the enzyme that deactivates HMG-CoA reductase requires

magnesium, making magnesium a reductase controller rather than inhibitor. Magnesium is also necessary for the activity of lecithin cholesterol acyl transferase (LCAT), which lowers LDL-C

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and triglyceride levels and raises HDL-C levels.” <sup>175</sup>

Desaturase is another magnesium-dependent enzyme involved in lipid metabolism that statins do not directly affect.

DHEA is a steroid hormone produced by the adrenal gland and the ovaries and converted to testosterone and estrogen. After being secreted by the adrenal glands, it circulates in the bloodstream as DHEA-sulfate (DHEA-S) and is converted as needed into other hormones. Magnesium chloride, when applied transdermally, is <sup>20</sup>

reported by Dr. Norman Shealy to increase DHEA. <sup>176</sup> Dr. Shealy has determined that when the body is presented with adequate levels of magnesium at the cellular level, it will begin to naturally produce DHEA and also DHEA-S.

Transdermal is the ultimate way to replenish cellular magnesium levels. Every cell in the body bathes and feeds in it and even DHEA levels are increased naturally.

Dr. Norman Shealy

This effect is not seen in oral or intravenous magnesium administration and Dr. Shealy has a patent pending in this area.

It is thought that transdermal application interacts in some way with the fatty tissues of the skin to create the affect. Studies link low levels of DHEA to chronic inflammation, immune dysfunction, depression, rheumatoid arthritis, type 2 diabetes complications, and greater risk for certain cancers, heart disease, and osteoporosis.

Magnesium is the “lamp of life”—it operates at the core of physiology offering us what can only be called scientific miracles in medicine. The bedrock of medicinal practice sits upon the metal magnesium for it is at the exact center of biological life as are air and water. All of life collapses around its loss, but with only the smallest amount of caring and intelligence we can replete what has been lost inside of a person’s cells. The realization that magnesium is at the center of life in chlorophyll should help us place magnesium in the temple where it deserves to be.

## 1. The Insulin Magnesium Story

Magnesium is necessary for both the action of insulin and the manufacture of insulin.

Magnesium is a basic building block to life and is present in ionic form throughout the full landscape of human physiology.

Without insulin though, magnesium doesn’t get transported from our blood into our cells where it is most needed. When Dr. Jerry Nadler of the Gonda Diabetes Center at the City of Hope Medical Center in Duarte, California and his colleagues placed 16 healthy people on magnesium-deficient diets, their insulin became less effective at getting sugar from their blood into their cells where it’s burned or stored as fuel. In other words, they became less insulin sensitive, or what is called insulin resistant. And that’s the first step on the road to both diabetes and heart disease.

Diabetes mellitus is associated with magnesium depletion, which in turn contributes to metabolic complications of diabetes including vascular disease and osteoporosis. Intracellular depletion is directly connected to the impaired ability of insulin to increase intracellular magnesium during insulin deficiency or insulin resistance.

Insulin is a common denominator, a central figure in life, as is magnesium. The task of insulin is to store excess nutritional resources. This system is an evolutionary development used to save energy and other nutritional necessities in times (or hours) of abundance in order to survive in times of hunger. Little do we appreciate that insulin is not just responsible for regulating sugar entry into the cells but also magnesium, one of the most

important substances for life. It is interesting to note here that the kidneys are working at the opposite end, physiologically dumping from the blood excess nutrients that the body does not need or cannot process in the moment.

Controlling the level of blood sugars is only one of the many functions of insulin.

Insulin plays a central role in storing magnesium but if our cells become resistant to insulin, or if we do not produce enough insulin, then we have a difficult time storing magnesium in the cells where it belongs. When insulin processing becomes problematic, magnesium gets excreted through our urine instead, and this is the basis of what is called magnesium-wasting disease.

There is a strong relationship between magnesium and insulin action.

Magnesium is important for the effectiveness of insulin. A reduction

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of magnesium in the cells strengthens insulin resistance. <sup>177</sup> , 20

<sup>178</sup>

Low serum and intracellular magnesium concentrations are associated with insulin resistance, impaired glucose tolerance, 20

20

and decreased insulin secretion. <sup>179</sup> , <sup>270</sup> , <sup>21</sup> Magnesium improves

insulin sensitivity thus lowering insulin resistance. Magnesium and insulin need each other. Without magnesium, our pancreas won't secrete enough insulin—or the insulin it secretes won't be efficient enough—to control our blood sugar.

Magnesium in our cells helps the muscles to relax, but if we can't store magnesium because the cells are resistant then we lose it. Losing



magnesium makes the blood vessels constrict, affecting our energy levels and causing an increase in blood pressure. We begin to understand the intimate connection between diabetes and heart disease when we look at the closed loop between declining magnesium levels and declining insulin efficiency.

Though it would be a long stretch to compare insulin with chlorophyll, we are walking a trail at the very nuclear core of life. It's the magnesium trail and we find to our surprise that it takes us into intimate contact with the very structure and foundation of life. The dedication of this chapter is to the beauty of magnesium, to its meaning in life, in health, and in medicine.

Every part of life is in love with magnesium—except allopathic medicine, which just cannot accept it in all its light, flame and beauty. Thousands of years ago the Chinese named it the beautiful metal and they were seeing something pharmaceutical medicine does not want to see for there is little money to be made from something so common.

In a study from Taiwan, the risk of dying from diabetes was inversely proportional to the level of magnesium in the drinking water. <sup>22</sup>

Dr. Jerry L. Nadler

Insulin resistance and magnesium depletion result in a vicious cycle of worsening insulin resistance and decrease in intracellular  $Mg(2+)$  which limits the role of magnesium in vital cellular processes. <sup>23</sup> Magnesium is an important cofactor for enzymes involved in carbohydrate metabolism, so anything threatening magnesium levels threatens overall metabolism. Large epidemiologic studies in adults indicate that lower dietary magnesium and lower serum magnesium are associated with increased 20

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risk for type 2 diabetes. <sup>274</sup> , <sup>275</sup>

Redistribution of magnesium into cells may cause lower magnesium levels in the serum. Insulin causes this effect.

Researchers at the Institute of Internal Medicine, University of Palermo wrote, “Intracellular magnesium concentration has also been shown to be effective in modulating insulin action (mainly

oxidative glucose metabolism), offset calcium-related excitation-contraction coupling, and decrease smooth cell responsiveness to depolarizing stimuli.

A poor intracellular magnesium concentration, as found in noninsulin-dependent diabetes mellitus (NIDDM) and in hypertensive patients, may result in a defective tyrosine-kinase activity at the insulin receptor level and

exaggerated intracellular calcium concentration.”<sup>276</sup>

The link between diabetes mellitus and magnesium deficiency is well known. A growing body of evidence suggests that magnesium plays a pivotal role in reducing cardiovascular risks and may be involved in the pathogenesis of diabetes itself.

Dr. Jerry L. Nadler

Magnesium improves and helps correct insulin sensitivity, which is the fundamental defect that characterizes pre-diabetes, metabolic syndrome and even full-blown diabetes and heart disease. An intracellular enzyme called tyrosine kinase requires magnesium to allow insulin to exert its blood-sugar-lowering effects. In several studies, daily oral magnesium supplementation substantially improved insulin sensitivity by 10

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percent and reduced blood sugar by 37 percent.<sup>277, 278</sup>

Magnesium also helps correct abnormal lipoprotein patterns. We would expect to find larger improvements in this increased insulin sensitivity if magnesium is supplemented in a correct way, meaning through transdermal and oral methods combined with using liquid magnesium chloride

(magnesium oil) as compared to the very inefficient oral solid forms commonly used.

Improved insulin sensitivity from magnesium replacement can 20

markedly reduce triglyceride levels. <sup>279</sup> Reduced triglyceride availability, in turn, reduces triglyceride-rich particles, such as very-low-density lipoprotein (VLDL) and small low-density lipoprotein (small LDL), both of which are powerful contributors to heart disease. Magnesium supplementation can also raise levels 20

of beneficial high-density lipoprotein (HDL). <sup>370</sup>

Insulin regulates intracellular magnesium levels via activation of Na<sup>+</sup>/Mg<sup>2+</sup> exchange. Insulin's effect on Na/Mg exchange may explain the low cellular magnesium levels observed in vivo under hyperinsulinemic conditions. <sup>31</sup>

Magnesium and insulin need each other. Without magnesium, our pancreas won't secrete enough insulin—or the insulin it secretes won't be efficient enough—to control our blood sugar. Insulin is a hormone, and like many hormones, insulin is a protein. Insulin is secreted by groups of cells within the pancreas called islet

cells. Insulin has many more functions than we realize. It regulates the following:

Lifespan—Lower insulin levels equate to a longer life.

Blood sugar

Blood lipids

Excess nutrients (from glucose, carbs and calories) and converts them to fat

Muscle building

Protein storage

Magnesium levels in our body

Calcium levels in the body

Retains sodium levels

Cell division

Growth hormone

Liver functions

Sex hormones, estrogen, progesterone, testosterone Cholesterol in the body

Fat in our body

Magnesium is a cofactor for multiple enzymes involved in carbohydrate metabolism.<sup>32</sup> Adipocyte cells placed in low-magnesium media show reduction in insulin-stimulated glucose uptake.<sup>33</sup> Magnesium deficiency is associated with increased intracellular calcium levels, which may lead to insulin resistance. Low erythrocyte magnesium content increases membrane micro viscosity, which may impair insulin interaction with its 20

receptor.<sup>374</sup> Tyrosine kinase activity is decreased in muscle 20

insulin receptors of rats fed a low-magnesium diet.<sup>375</sup> These findings indicate that magnesium deficiency directly affects insulin signaling.

When magnesium levels fall, hyper secretion of adrenalin and insulin compensate. Their increased secretions help maintain the constancy of the levels in intracellular magnesium in the soft tissues. Plasma and intracellular magnesium concentrations are tightly regulated by insulin. But Dr. Ron Rosedale says that,

“Extra insulin floating around in the blood causes plaque buildup. They didn’t know why, but we know that insulin causes endothelial proliferation. Every step of the way, insulin is causing cardiovascular disease. It fills the body with plaque, it

constricts the arteries, it stimulates the sympathetic nervous system, and it increases platelet adhesiveness and coagulability of the blood.” So as we can see, when magnesium levels drop there is a cascade of physiological problems that corrupt the heart of our health.

1. Hemoglobin’s Oxygen-Carrying Capacity In humans, the most common factors that reduce the carrying capacity of the blood are bulk stress from dehydration, aluminum toxicity, and electrolyte imbalance.

The significance of proper blood circulation cannot be over-emphasized. The ability of our heart to pump blood throughout our body efficiently and effectively is the cornerstone of good health. Unfortunately, there are things that interfere with our heart’s ability to effectively move blood through our veins and arteries with a lack of hydration being a basic backdrop to other aggressive insults that starve and damage other parts of the body due to poor circulation.

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Dehydration <sup>376</sup> is one of the most

overlooked and basic causes of disease.

The root cause of degenerative disease comes from the body being unable to keep up with basic physiological functions, which leads to greater wear and tear. When the body, for any reason, cannot deliver the necessary nutrients and carry away metabolic wastes, the conditions for serious chronic disease are set up. Many problems in the vascular system can upset this vital life process and dehydration often underlies vascular deficiency. Dehydration is not thought of as degenerative disease but dehydration leads to deterioration damage, because nutrient and waste flows can be greatly diminished and even cut off at strategic points in the body.

Low-level dehydration guarantees the initiation of chronic pathology of one type or another.

Magnesium serves hundreds of important functions in the body and one of them has to do with the efficiency of red blood cells and their capacity to

carry oxygen. Researchers have investigated the effect of dietary magnesium (Mg) deficiency on the nutritive utilization and tissue distribution of iron (Fe). Magnesium deficient diet leads to significant decreases in the concentration of red blood cells (RBC), hemoglobin, and eventually a decrease in whole blood Fe (iron). In fact, we find many ways in which magnesium deficiency leads to problems with 20

oxygen transport and utilization. <sup>377</sup>

Chronic magnesium deficiency has also been shown to increase copper absorption and concentrations in plasma, muscle, kidney, 20

and liver. <sup>378</sup> Magnesium is involved with the transport gases across the red blood cell membranes as well as ions, amino acids, nucleosides, sugars, and water. Magnesium levels drop more slowly 20

in red blood cells than in the serum. <sup>379</sup>

A study by physiologist Henry C. Lukaski and nutritionist Forrest H. Nielsen (Grand Forks Human Nutrition Research Center) reveals important findings on the effects of depleted body magnesium levels on energy metabolism. The data shows that magnesium-deficient people used more oxygen during physical activity—their heart rates increased by about 10 beats per minute. “When the volunteers were low in magnesium, they needed more energy and more oxygen to do low-level activities than when they were in 20 20

adequate-magnesium status,” says Lukaski. 74 70

“The transport of oxygen in blood is undertaken by hemoglobin, the largest component of red blood cells. This protein collects oxygen in respiratory organs, mainly in the lungs, and releases it in tissues in order to generate the energy necessary for cell survival. Hemoglobin is one of the most refined proteins because its evolution and small mutations in its structure can produce anemia and other severe pathologies,” publishes the Institute for Research in Biomedicine (IRB Barcelona).

They continue, “More than a hundred years of study have led to the knowledge that hemoglobin uses mechanisms of cooperativity to optimize its function—that is to say, to collect the greatest amount of oxygen possible in the lungs and release it in tissues.

These mechanisms of cooperativity are related to changes in the structure of the hemoglobin protein.”

The structure of hemoglobin is easily compromised by heavy metals 20

like mercury (as are all sulfur-bearing proteins 74<sup>1</sup> like insulin, etc.). In my book *New Paradigms in Diabetic Care*, we nail down the mercury/ sulfur bond/ death and destruction scenario. You can bet your last medical dollar on the fact that high magnesium and selenium status is protective of red blood cells and thus of total oxygen carrying capacity.

The mechanism whereby red cells maintain their biconcave shape has been a subject of numerous studies. One of the critical factors for the maintenance of biconcave shape is the level of red cell adenosine triphosphate (ATP) levels. The interaction of calcium, magnesium, and ATP with membrane structural proteins exerts a significant role in the control of shape of human red 20

blood cells. 74<sup>2</sup> Magnesium enhances the binding of oxygen to haem 20

proteins. 74<sup>3</sup> The concentration of  $Mg^{2+}$  in red cells is relatively high but free  $Mg^{2+}$  is much lower in oxygenated red blood cells than in deoxygenated ones. This suggests some kind of magnesium pump where oxygen climbs aboard the red cells and magnesium jumps off only to have to jump right back on again.

Dr. L. O. Simpson asserts that chronic fatigue immune deficiency syndrome (CFIDS) results from “insufficient oxygen availability due to impaired capillary blood flow.” This would naturally reflect to the mitochondria that would be having their O<sub>2</sub>

deprivation problems. In healthy people, most red blood cells are smooth-surfaced and concave-shaped with a donut-like appearance, like a donut

where the hole doesn't go all the way through. These discocytes have extra membranes in the concave area that give them the flexibility needed to move through capillary beds, delivering oxygen, nutrients, and chemical messengers to tissue and removing metabolic waste, such as carbon dioxide and lactic acid.

Abnormal magnesium-deprived red blood cells lack flexibility that allows them to enter tiny capillaries. These nondiscocytes are characterized by a variety of irregularities, including surface bumps or ridges, a cup or basin shape, and altered margins instead of the round shape found in discocytes. When people become ill or physically stressed (more magnesium deficient), a higher percentage of discocytes transform into the less flexible nondiscocytes.

Magnesium stimulates the movement of

oxygen atoms from the bloodstream to the cells.

Magnesium and zinc prevent the binding of carbon monoxide (CO) to haem, which otherwise binds 25,000 times more strongly than does oxygen. The dissociation of oxygen is also helped by magnesium because it provides an oxygen adsorption isotherm that is hyperbolic. It also ensures that the oxygen dissociation curves are sigmoidal, which maximizes oxygen saturation with the gaseous pressure of oxygen.

Oxygen dissociation with increased delivery to the tissues is increased by magnesium through elevation of 2,3-bisphosphoglycerate/DPG (Darley, 1979). Magnesium stabilizes the ability of the porphyrin ring to fluoresce. Free radical attack of haemoglobin yields ferrylhaemoglobin [ $\text{HbFe}^{4+}$ ] (Agnillo and Alayash, 2001), which is inhibited by magnesium (Rock et al., 1995).

Magnesium prevents blood vessels from constricting, thus warding off rises in blood pressure, strokes and heart attacks.

Magnesium inhibits the release of thromboxane, a substance that makes blood platelets stickier.



Dr. Jerry L. Nadler

Red blood cell (RBC) deformability is an important factor in determining movement of red blood cells through the

microcirculation. Intravenous magnesium therapy over a 24-hour period has been shown to increase RBC-deformability even in pregnancies with normal RBC-deformability. An increase of RBC-deformability with magnesium administration offers therapeutic benefit for the treatment of reduced blood flow seen in most 20 20

cases of preeclampsia. 74 74

D. F. Treacher and R. M. Leach teach, "Oxygen transport from environmental air to the mitochondria of individual cells occurs as a series of steps. The system must be energy-efficient (avoiding unnecessary cardiorespiratory work), allowing efficient oxygen transport across the extravascular tissue matrix. At the tissue level, cells must extract oxygen from the extracellular environment and use it efficiently in cellular metabolic processes."

Patients with chronic fatigue syndrome (CFS) have low red blood cell magnesium. The physiological concept of fatigue as a consequence of inadequate oxygen delivery is accepted, tying oxygen-carrying capacity directly to magnesium. This is good medicine to understand and appreciate.

Magnesium-deficiency studies on the kidneys have shown intraluminal calcareous deposits in the corticomedullary area and damage to the tubular epithelium. Damage to the kidneys from magnesium deficiency creates a situation that intensifies magnesium deficits.

Micropuncture studies have shown that most active renal tubular reabsorption of magnesium occurs at sites that are potentially damaged by magnesium deficiencies, meaning these conditions can cause renal tubular magnesium wasting. Both hyperparathyroidism and hypervitaminosis D increase blood and thus urinary loads of calcium and thus cause even further magnesium loss.

Most renal reabsorption of magnesium occurs in the proximal tubule and the thick ascending limb of the loop of Henle. In hypomagnesemic patients, the kidney may excrete as little as 1

mEq/L of magnesium. Magnesium will be removed from bone stores in times of deficiency. Primary renal disorders cause hypomagnesemia by decreased tubular reabsorption of magnesium by the damaged kidneys. This condition occurs in the diuretic phase of acute tubular necrosis, post-obstructive diuresis, and renal tubular acidosis.

## 1. Magnesium Medicine Basics

Magnesium chloride has a dramatic effect on cell life and is safer to use than aspirin and effective in a much broader sense than vitamin C.

Magnesium chloride is one of the best-kept secrets, not only in naturopathic medicine, but also in the world of allopathic medicine where it is used in emergency rooms to save lives.

Public health officials and the pharmaceutical industry really don't want anyone to know that a naturally-occurring nutritional mineral can save lives because they would then have to admit that there exists a safe and effective universal medicine that can be used in most clinical situations. This is actually an exciting medical discovery—that magnesium, one of the most common and most necessary nutritional minerals—is a fast-acting, safe, and effective medicine.

“My name is Hallgrimur Magnusson and I am an anesthesiologist in Iceland. The Icelandic medical authorities have canceled my license to prescribe intravenous magnesium. One of the reasons why is that many people came to me and asked for this kind of treatment because of many kinds of pain including restless leg syndrome. They said to me that the references I gave them were useless because I bought the book on the internet. I sent them a letter saying that 60-70 percent of people in western countries are magnesium deficient but they could not find references to satisfy themselves of this so their official position is that I took this out of the blue. Incredibly they say they cannot find anything in Medline that support my theories. They say that magnesium has no effect on blood

vessels, no effect on muscles and no effect on hemoglobin curvature or the release of oxygen to the cells. They say that giving magnesium intravenously is a dangerous thing to do and outweighs all benefits.”

“Like two diverging paths, it appears that the more we learn about the benefits of magnesium, the more we uncover about the side effects of prescription drugs,” says Dr. Carolyn Dean.

Magnesium chloride is a basic mineral nutrient used by the food industry. Magnesium chloride treatments address systemic nutritional deficiencies, act to improve the function of our cells and immune system, and help protect cells from oxidative damage. It’s a systemic medicine as well as a local one bringing new life and energy to the cells. Magnesium is the single most important mineral for maintaining proper electrical balance and facilitates smooth metabolism in the cells. One of the major properties of magnesium is that of stabilizing cell membranes even at the blood-brain barrier.

Physicians fail to look for magnesium deficiencies in their patients and this is a tragedy for modern medicine and the patients they serve.

A lack of this critical nutrient is a major factor in many health 20 20

problems. Common conditions such as mitral valve prolapse, 74 75

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migraines, attention deficit disorder, autism, 74 76 fibromyalgia, 20 20

anxiety, 74 77 asthma, and allergies have all been associated with magnesium deficiency. The list of diseases associated with

magnesium deficiency is inexhaustible because, like air and water, magnesium is basic to life.

Magnesium deficiency is a core instigator of pathology as is iodine and many other vitamins and minerals when they are lacking. The difference

with magnesium is that we need a lot of it each day just to keep up with the demands of the body.

Magnesium is to the body like oil is to a car's engine—if not enough is present, problems arise quickly, which in human physiology translates into heart disease, strokes, neurological dysfunction, and cancer.

If you do not have sufficient amounts of magnesium, your body cannot make or utilize protein. Similarly, if you don't have an adequate amount of magnesium, the vitamins C and E that you consume cannot be used.

Magnesium chloride is a universal medicine and is something strong enough to use in dramatic life-threatening instances during emergency treatment. It has the power to rejuvenate the aging body, and in the form of magnesium chloride, it is a remarkable infection fighter and should be prescribed to the majority of patients. Importantly, it provides a foundation and support for other therapeutic and pharmaceutical interventions.

Most people who are aware of the need for magnesium supplementation take their magnesium in an oral form, but many things affect magnesium absorption from the gut, including medications an individual is on. The health status of the digestive system and the kidneys significantly influence magnesium status. Only one-third to one-half of dietary magnesium is absorbed into the body at best. Gastrointestinal disorders that impair absorption, such as Crohn's disease, can limit the body's ability to absorb magnesium.

Just a few of the positive results that have been reported from the utilization of transdermal magnesium are as follows: Aids in hypertension.

Rubbed consistently onto age spots will often produce fading and most will disappear.

Massaged into arthritic joints will frequently render almost instant reprieve from pain.

Sprayed into the mouth a number of times per day will invigorate the medulla elongate and stimulate enamel on the teeth.

Magnesium oil in a hot bath will impart a very relaxing soak while delivering a vast amount of magnesium to the cells; great for restless leg syndrome.

Assists in the prevention of diabetes; enhances insulin secretion, facilitating sugar metabolism. Without magnesium, insulin is not able to transfer glucose into cells.

Assists in the prevention of strokes and aids in recovery.

Improves insomnia issues.

Improves cardiac health.

Improves overall energy production (ATP).

Helps maintain memory function.

Is crucial for the removal of toxins and heavy metals.

Helps build bones and make proteins.

Sprayed on wrinkled skin will, in due course, begin to smooth them out.

Has calming effect on the nervous system.

Induces improvement in autistic individuals.

Is an anti-cholesterol aid.

Addresses asthma (both histamine production and bronchial spasms increase with magnesium deficiency).

Prevents cystitis-bladder spasms that are exacerbated by magnesium deficiency.

Prevents premenstrual syndrome and cramping pain during menses.

Tooth decay: magnesium deficiency perpetrates an unhealthy balance of phosphorus and calcium in saliva, which damages teeth.

Raynaud's syndrome: assists in the relaxation of spastic blood vessels that cause pain and numbness of the fingers.

Has been utilized in treating central nervous symptoms of vertigo and confusion.

Addresses musculoskeletal conditions such as fibrositis, muscle 20 20 spasm, eye twitches, neck and back pain, and fibromyalgia. 74 78

For anxiety and panic attacks: helps by keeping adrenal stress hormones under control.

Increases DHEA levels, which is a biomarker for aging. DHEA has been referred to as the "master hormone" and when produced at sufficient levels, will induce the production of all of the other hormones whose depletion can be associated with many symptoms of 20 20

aging. 74 79

It is no exaggeration for me to say that magnesium saved my life.

But it is ironic that I am the one saying it, because during my diverse medical career in general medicine, my greatest expertise has always been prescription drugs, not natural supplements.

Dr. Jay S. Cohen

The Magnesium Solution for High Blood Pressure Magnesium serves hundreds of important functions in the body.

Researchers all over the world have confirmed its vital role, yet, despite the intensive scientific brainpower that has been directed toward magnesium, most doctors know hardly anything about it and rarely consider using it for treating patients. The goal of this book is to change this.

What we have found is that magnesium chloride, applied transdermally, is the ideal magnesium delivery system—

with health benefits unequalled in the entire world of medicine.

Nothing short of a miracle is to be expected with increases in the cellular levels of magnesium if those levels have been depleted. There is no wonder drug that can claim, in the clear, what magnesium chloride can do. Most people will show dramatic improvements in the state of their health when they replete their magnesium levels in an effective manner.

With “brine solutions” called magnesium oil, the concentrate can simply be applied to the skin or poured into bath water, and in an instant we have a powerful medical treatment. Intensive transdermal and oral magnesium therapy can be safely applied day in and day out for a constant strengthening of health. Magnesium is nothing short of a miracle to a person deficient in this mineral. So clear and observable are the effects that there is no mistake, no mysticism, no false claim made.

Medicine today is more and more frequently described in terms of science. With the origin and development of drugs and surgical techniques, modern medicine has thought itself to be evermore exact and evermore resembling the hard sciences of chemistry and physics. Magnesium comes to us with a depth of scientific evidence that dwarfs the evidence presented by pharmaceutical companies for any of their prescription drugs.

## 1. Magnesium Thirst, Magnesium Hunger

Magnesium deficiency should always be included in the differential diagnosis of patients with chronic disorders.

Because magnesium is involved in so many processes in the body, once a deficiency develops, that deficiency can spiral out of control. A low magnesium level causes metabolic functions to decrease, causing further stress on the body, reducing the body’s ability to absorb and retain magnesium.

Studies show that as many as half of all 20 20

Americans do not consume enough magnesium. 75 70

Massachusetts Institute of Technology

The latest government study shows a staggering 68 percent of Americans do not consume the recommended daily intake of magnesium. Even more frightening are data from this study showing that 19 percent of Americans do not consume even half of the 20

government's recommended daily intake of magnesium. 75<sup>1</sup> According to the U.S. Department of Health and Human Services, nearly all of us fail to achieve even the modest magnesium RDAs of 420 mg for adult males and 320 mg for adult females. Most American adults ingest about 270 mg of magnesium a day, well below the RDA and enough to generate a substantial cumulative deficiency over 20

months and years. 75<sup>2</sup>

And yet there are those who have the audacity to stand up and say that: "Diseases caused by nutrient deficiency are rare in the 20

United States." 75<sup>3</sup> How is this possible when we know for a fact that the majority of Americans are deficient in magnesium? The New York Times gives us an idea: "New evidence keeps emerging that the medical profession has sold its soul in exchange for what can only be described as bribes from the manufacturers of 20 20

drugs and medical devices." 75 74

When the U.S. Department of Agriculture surveyed 37,000

individuals (including all age groups from the newborn to the elderly), only 25 percent of these persons had a dietary magnesium intake that equaled or exceeded the RDA proposed by the U.S. National Academy of Sciences. A whopping 75 percent of the individuals did not meet the RDA criterion.

The food supply has been steadily becoming magnesium-poor since 1909:

20 20



The clinical laboratory evaluation of magnesium status is primarily limited to the serum magnesium concentration, 24-hour urinary excretion, and percent retention following injected magnesium. However, results for these tests do not necessarily correlate with intracellular magnesium because less than one 20 20

percent of the total body magnesium is present in blood. 75 76

Approximately half of the total magnesium in the body is present in soft tissue and the other half in bone.

Magnesium deficiency can affect virtually every system of the body. Unfortunately magnesium absorption and elimination depend on a very large number of variables, at least one of which often goes awry, leading to a magnesium deficiency that can present itself with multiple signs and symptoms.

Most doctors and laboratories don't even include magnesium status in routine blood tests. Thus, most doctors don't know when their patients are deficient in magnesium, even though studies show that the majority of Americans are deficient. Consider Dr. Norman Shealy's statements, "Every known illness is associated with a magnesium deficiency" and, "Magnesium is the most critical mineral required for electrical stability of every cell in the body. A magnesium deficiency may be responsible for more diseases than any other nutrient."

These statements of fact by Dr. Shealy expose a gaping hole in modern medicine, which explains a good deal about iatrogenic (doctor-caused) death and disease. Because magnesium deficiency is largely overlooked, millions of Americans suffer needlessly, or are having their symptoms treated with expensive drugs, when they could be cured with magnesium supplementation.

Patients have to recognize the signs of magnesium thirst or hunger pretty much on their own since allopathic medicine is so lost in this regard. There is a relationship between what we perceive as thirst and deficiencies in

electrolytes. A person asked me, “Why am I dehydrated and thirsty when I drink so much water?” Thirst can mean not only lack of water but it can also mean that one is not getting enough electrolytes.

All those years when doctors used to tell their patients

“It’s all in your head” were years the medical profession just could not see the forest for the trees regarding magnesium deficiency.

A full outline of magnesium deficiency was beautifully presented in an article by Dr. Sidney Baker: “Magnesium deficiency can affect virtually every organ system of the body. With regard to skeletal muscle, one may experience cramps, muscle tension, muscle soreness, including backaches, neck pain, tension headaches, and jaw joint (or TMJ) dysfunction. Also, one may experience chest tightness or a peculiar sensation that he can’t take a deep breath. Sometimes a person may sigh a lot. Symptoms involving impaired contraction of smooth muscles include constipation, urinary spasms, menstrual cramps, difficulty swallowing or a lump in the throat—especially provoked by eating sugar, photophobia—especially difficulty adjusting to oncoming bright headlights in the absence of eye disease, and loud noise sensitivity from stapedius muscle tension in the ear. Other symptoms include insomnia, anxiety, hyperactivity and

restlessness with constant movement, panic attacks, agoraphobia, and premenstrual irritability. Magnesium deficiency symptoms involving the peripheral nervous system include numbness, tingling, and other abnormal sensations, such as zips, zaps and vibratory sensations.”

Dr. Baker continues, “Symptoms or signs of the cardiovascular system include palpitations, heart arrhythmias, and angina due to spasms of the coronary arteries, high blood pressure, and mitral valve prolapse. Be aware that not all of the symptoms need to be present to presume magnesium deficiency, but many of them often occur together. For example, people with mitral valve prolapse frequently have palpitations, anxiety, panic attacks and premenstrual symptoms. People with magnesium deficiency often seem to be “uptight.” Other general symptoms include a salt craving, both carbohydrate craving and carbohydrate intolerance, especially of chocolate, and breast tenderness.”

Like water, we need magnesium every day. There is an eternal need for magnesium as well as water, and when magnesium is present in water, life and health are enhanced.

One of the principal reasons doctors write millions of prescriptions for tranquilizers each year is the nervousness, irritability, and jitters largely brought on by inadequate magnesium in the diet. Persons only slightly deficient in magnesium become irritable, high-strung, and sensitive to noise, hyper-excitable, apprehensive, and belligerent.

If magnesium is severely deficient, the brain is particularly affected. Clouded thinking, confusion, disorientation, marked depression, and even the terrifying hallucinations of delirium are largely brought on by a lack of this nutrient and remedied when magnesium is given. Symptoms of multiple sclerosis (MS) that are also symptoms of magnesium deficiency include muscle spasms, weakness, twitching, muscle atrophy, an inability to control the bladder, nystagmus (rapid eye movements), hearing loss, and osteoporosis. People with MS have higher rates of epilepsy than controls. Epilepsy has also been linked to magnesium deficiencies.

1. Magnesium Deficiency & Sudden Death by Cardiac Arrest Magnesium deficiency appears to

have caused eight million sudden coronary 20 20

deaths in America during the period 1940-1994. 75 77

Paul Mason

If you are interested in heart health you have no choice but to be interested in magnesium. It is the emergency room intensive

care medicine that can be used to great effect before, during and after cardiac arrest. Magnesium chloride specifically is the most flexible and useful form of magnesium because it can be injected, taken orally, and even used transdermally for direct application and absorption through the skin.

Almost all adults are concerned about the condition of their heart and cardiovascular system. Some live in constant fear wondering whether any ache, cramp, or pain in their upper body is a sign of a heart attack. There isn't an adult living in North America that hasn't lost a loved one or a family member to heart disease. The fact is: heart attacks kill, and they kill millions every year.

Chernow et al., in a study of postoperative ICU patients, found that the death rate was reduced from 41 percent to 13 percent for patients without hypomagnesemia (low magnesium levels). Other 20 20

post heart surgery studies 75 78 showed that patients with hypomagnesemia experienced more rhythm disorders. Time on the ventilator was longer and morbidity was higher than for patients with normal magnesium levels.

Another study showed that a greater than 10 percent reduction of serum and intracellular magnesium concentrations was associated with a higher rate of postoperative ventricular arrhythmias. The administration of magnesium decreases the frequency of postoperative rhythm disorders after cardiac surgery.

Magnesium has proven its value as an adjuvant in postoperative analgesia. Patients receiving magnesium required less morphine, had less discomfort and slept better during the first 48 hours 20 20

than those receiving morphine alone. 75 79

It is established that clinically significant changes in a number of electrolytes occur in patients with congestive heart failure (CHF).

Magnesium ions are an essential requirement for many systems, and clearly magnesium deficiency is a major risk factor for survival of CHF patients. In animal experiments, magnesium has been shown to be involved in several steps of the atherosclerotic process as well as magnesium ions playing an extremely important role in CHF and various cardiac arrhythmias.

Magnesium is also required for muscle relaxation.

Lower magnesium levels can result in symptoms ranging from tachycardia and fibrillation to constriction of the arteries, angina, and instant death.

Due to lack of magnesium, the heart muscle can develop a spasm or cramp and stop beating. Most people, including doctors, don't know it, but without sufficient magnesium we will die. It is important to understand that our life span will be seriously reduced if we run without sufficient magnesium in our cells, and one of the main ways our lives are cut short is through cardiac arrest (heart attack). Yet when someone dies of a heart attack doctors never say, "He died from magnesium deficiency."

Allopathic medicine ignores the true causes of death and disease, and in the field of cardiology, this is telling.

Magnesium is an important protective factor 20 20

for death from acute myocardial infarction. 76 70

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Dr. Jean Durlach 76<sup>1</sup> explains that the body has numerous compensatory mechanisms that allow magnesium deficiency to go undetected, which leads to the development of what he calls

"latent nervous system hyperexcitability." In other words, a patient will already be deficient in magnesium prior to the development of symptoms. Too often the first clear sign of deficiency is cardiac arrest and death. Forty percent of all first heart attacks end in death!

One of the most important actions of magnesium is its vasodilating effects, which improves the blood supply to ischemic areas and reduces infarct size.

A ten-year study of 2,182 men in Wales found that those eating magnesium-low diets had a 50 percent higher risk of sudden death from heart attacks than those eating one-third more magnesium.

Also, high magnesium eaters were only half as likely to have any type of cardiovascular incident such as non-fatal heart attacks, 20

strokes, angina (chest pain) or heart surgery. 76<sup>2</sup>

Magnesium and calcium work together to control muscle action, though calcium becomes increasingly toxic in the face of any kind of magnesium deficiency. Calcium tightens the muscles; magnesium relaxes the muscles. With insufficient magnesium the muscles stay tense and through the years may cause a cramp in the muscle. This could happen when you have too much calcium or too little magnesium. Too much calcium causes the heart to go into a spasm and this can cause a heart attack.

Magnesium helps induce passage of nutrients in and out of cells and thus affects the life process. As magnesium has a stabilizing effect on membranes, it can be used to great effect in the treatment of cardiac rhythm disorders.

Magnesium is cardiology's

silver bullet against heart disease.

The strides in the understanding, prevention, and treatment of coronary artery disease (CAD) and acute myocardial infarction (MI) over the past 20 years has been an illusion. CAD remains the leading cause of death for both men and women in the United States. The management of acute MI now routinely involves a complex array of interventions including reperfusion therapy and cardio-protective and anti-thrombogenic agents. Yet both morbidity and mortality remain unacceptably high, particularly in the elderly.

### Sudden Arrhythmia Death Syndrome

Sudden arrhythmia death syndrome is a disorder or malfunction of the electrical system of the heart that can lead to the death of apparently healthy people without any warning. The problem centers on the length of time it takes the electrical system to recharge following a heartbeat. This is known as the QT interval.

People who have a long QT interval are more vulnerable to a very fast, abnormal heart rhythm, or arrhythmia.

A healthy heart generates stable, predictable electrical impulses. Lack of magnesium permits unstable electrical impulses 20

20 20

in the heart to emerge, 76<sup>3</sup> generating abnormal heart rhythms. 76 74

In fact, much magnesium research over the years has focused on its administration during heart attack to reduce death from fatal 20 20

heart rhythms. 76 75

Magnesium should be taken for all conditions of the heart except for when the blood pressure is too low or the threat of kidney failure is present. Since there is no drug that can substitute for magnesium, it is indicated for the majority of heart patients. With magnesium the process of deficiency is slower and more hidden but eventually total cell physiology is compromised.

Magnesium, particularly in its chloride form, is the definitive medicine for both the prevention and treatment of heart disease.

### Magnesium Deficiency in Heart Disease

Substantial evidence has associated magnesium deficiency with sudden cardiac death, a condition that claims 300,000 lives every year. Dr. Sarah Myhill acknowledges that magnesium deficiency is almost universal in patients with heart disease. She says that low magnesium is:

A risk factor for arteriosclerosis

A cause of arterial spasm (blood pressure and angina) A cause of dysrhythmias

A possible cause of mitral incompetence (leaky heart valve) A cause of sticky blood (increased risk of clotting) A cause of raised cholesterol and triglycerides

Possibly associated with a buildup of homocysteine Magnesium deficiency may result in the formation of clots in the heart and brain and may contribute to calcium deposits in the kidney, blood vessels, and heart. Heart failure resulting from fibrillation and lesions in the small arteries is linked to a deficiency of magnesium, as is vasodilation, which can be followed by hyperkinetic behavior and fatal convulsions.

If you ask your doctor what causes a heart attack (myocardial infarction), he will tell you what he learned in medical school: heart attacks usually occur when a blood clot forms inside a coronary artery at the site of an atherosclerotic plaque. The blood clot cuts off blood flow to part of the heart, starving it of oxygen and the heart muscle begins to die. In a small percentage of cases, blood flow is cut off due to a vasospasm (the muscles in the artery wall contracts suddenly), which constricts the artery and flow is reduced depending on how much plaque has been already deposited. Either way, atherosclerosis is the main cause and oxygen deprivation is the final result.

The American Heart Association reports that over 60 million Americans have one or more types of cardiovascular disease, the leading cause of death in the United States.

Not a word is mentioned about magnesium levels in traditional allopathic conceptions of heart disease, yet sudden death via cardiac arrest is much more common in magnesium-deficient people.

We maximize our chances of dying from a heart attack when we ignore our magnesium needs. Statistically, sudden death increases in areas where water supplies are magnesium-deficient.

## 1. Inflammation & Systemic Stress

Inflammation & Pain Management with Magnesium Chloride Obesity without inflammation

does not result in insulin resistance.

Dr. Jerold Olefsky



Inflammation plays a key role in a set of disorders that include type 2 diabetes, obesity, and heart disease—collectively called the metabolic syndrome. Dr. Steve Shoelson, a professor of medicine at Harvard Medical School, has focused squarely on inflammation. Epidemiologists have found that patients with type 2 diabetes and cardiovascular disease have slightly elevated levels of inflammatory markers in their bloodstream, raising the possibility that inflammation might be associated with the development of these diseases, and pro-inflammatory cytokines

such as TNF- $\alpha$  and IL-6 promote insulin resistance in experimental models. 76 76

Inflammation itself has been well studied by immunologists: after an infection, a host of different types of immune cells are deployed to the infection site to control the infection. But Dr.

Shoelson says that the situation is different in patients with metabolic diseases: the same markers of an immune response are present, but they persist chronically at low levels instead of following the dramatic rise and fall in an infection.

Inflammation has been shown to be linked to insulin resistance and to defective insulin signaling in non-obese diabetic (NOD) mice.

Several years ago, Shoelson's team was studying mechanisms underlying insulin resistance. Insulin resistance is the failure of the body to respond to its own insulin; it is a condition that raises blood sugar and can lead to diabetes. The researchers found reports from more than a century ago that high doses of anti-inflammatory medications called salicylates lowered the blood sugar levels of patients with diabetes.

Medicine does not recognize how subtle, constant, and easily triggered inflammatory processes can be. "Eating induces an inflammatory state in everyone. Normally, inflammation occurs for three or four hours after eating but will then taper off. Though people can't avoid eating, Dr. Dandona says they can avoid what and how much they eat. He says, "If

people eat McDonald's-type meals every three or four hours, and many do, they spend most of their time in a pro-inflammatory state."

"Inflammation in blood vessels is one of the main drivers of atherosclerosis, and diabetes makes it much worse," said Dr. Jun-ichi Abe of the University of Rochester Medical Center. Dr. Abe said that in people without diabetes, fast blood flow triggers anti-inflammatory enzymes, endothelial nitric oxide synthase and other factors, which block the ability of pro-inflammatory immune cells to hone in on and adhere to diseased portions of blood

vessels. 76 77

A study done at New York University, published in March 2008, found that pregnant women with periodontal (gum) disease have an increased risk of developing gestational diabetes mellitus than

pregnant women with healthy gums. 76 78 Again we see inflammation in diabetes with the inflammation of the gums spreading to the rest of the body through the blood vessels.

Inflammation plays a pivotal role in all stages of atherosclerosis, which is the progressive

narrowing and hardening of the arteries over time.

Inflammation is the activation of the immune system in response to infection, irritation, or injury. Characterized by an influx of white blood cells, redness, heat, swelling, pain, and dysfunction of the organs involved, inflammation has different names when it appears in different parts of the body. Most allergy and asthma sufferers are familiar with rhinitis (inflammation of the nose), sinusitis (inflammation of the sinuses), and asthma (inflammation of the airways), but inflammation is also behind arthritis (inflammation of the joints), dermatitis (inflammation of the skin), and so on.

The inflammatory response can be acute or chronic.

Acute inflammation typically lasts only a few days.

This response usually promotes healing but, if uncontrolled, may become harmful.

The primary objective of acute inflammation is to localize and eradicate the irritant and repair the surrounding tissue, but this completely changes in chronic low-grade inflammatory states.

Chronic low-grade inflammation is one of the characteristics of the metabolic syndrome and interferes with insulin physiology.

Ignorance has prevailed over the interrelationship between muscular lipid accumulation, chronic inflammation and insulin resistance because the central mediating factor is magnesium. It is magnesium that modulates cellular events involved in inflammation.

There are many factors that trigger inflammation. They are found in both our internal and external environments and include excessive levels of the hormone insulin (insulin resistance), emotional stress, environmental toxins (heavy metals), free-radical damage, viral, bacterial, fungal and other pathogenic infections, obesity, over-consumption of hydrogenated oils, periodontal disease, radiation exposure, smoking, spirochetes such as the *Borrelia* that causes Lyme disease, and certain pharmacological drugs. Problems with insulin metabolism are a major contributor to cardiovascular disease. It results in the inability to properly store magnesium, causing blood vessels to constrict, elevated blood pressure, and coronary arterial spasm, all of which can result in a heart attack.

Excess insulin causes retention of sodium, fluid retention, 20 20

elevated blood pressure, and congestive heart failure. 76 79

Dr. Ron Rosedale

Inflammatory reactions in the body are a valuable predictor of impending heart attack. Dr. Robert Genko, editor of the American

Academy of Periodontal Journal , claims that persons with gingival disease (an inflammatory disorder) are 27 times more likely to suffer a heart attack

than are persons with healthy gums. An American Heart Association paper disclosed that 85

percent of heart attack victims had gum disease compared to 29

percent of healthy similar patients.

When magnesium levels of fall researchers note a profound increase of inflammatory cytokines 20 20

present, along with increased levels of histamine. 77 70

Magnesium deficiency causes and underpins chronic inflammatory buildups. This concept is intriguing because it suggests a fundamentally simpler way of warding off disease. Instead of different treatments for heart disease, Alzheimer's and colon cancer, we apply a single, inflammation-reducing remedy that would prevent or treat these and other deadly diseases. The key words here are "prevent" or "treat" but please notice the word is not "cure". Though magnesium is a cure for many of our ailments, full treatment protocols are needed. It is a protocol of basic items like magnesium, iodine, alpha lipoic acid, sodium bicarbonate, sodium thiosulfate, whole-food vitamin C, natural vitamin D from the sun, spirulina, and some other important items like purified water that will make a big difference in a host of chronic diseases.

Once we understand the critical importance of inflammation and glutathione depletion in brain diseases, we can take steps to prevent or even reverse the damage.

Dr. David Perlmutter

Inflammation and systemic stress are central attributes of many pathological conditions. In magnesium we have found a potent medicinal that is effective across a wide range of pathologies.

Pharmaceutical companies need look no further than the seashore, which contains millions of tons of magnesium chloride, the perfect anti-inflammatory agent.

Researchers recognize a silent kind of inflammation . This type of internal inflammation has an insidious nature and is the culprit behind diabetes and heart disease. The chronic and continuous low-level stress that silent inflammation places on the body's defense systems often results in an immune system breakdown. Magnesium deficiency is a parallel silent insult happening at the core of our physiology. Magnesium deficiencies feed the fires of inflammation and pain. We could very well be

“suffering from” magnesium deficiency, but we most likely will not know it until we suddenly have cardiac arrest.

Epidemiologic studies have shown an inverse relationship between 20  
magnesium in the drinking water <sup>771</sup> and cardiovascular mortality.

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<sup>77 2</sup> This association between magnesium in drinking water and ischemic heart disease was reconfirmed in a major review of the literature done by epidemiologists at Johns Hopkins University.

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<sup>77 3</sup> Since most heart disease is marked by various levels of inflammation, these studies were all highlighting the hidden relationship between inflammation and magnesium deficiency.

Another reason that chronic inflammation can take us into the hell fires of pain is that magnesium gets depleted in conditions of inflammation.

Beyond all the common symptoms of inflammation we find, the body tissues themselves may lose their ability to recognize the difference between cells that are “self” and those that are not, and the body may thus mistakenly identify its own cells as foreign invaders. This internal programming error then continues to trigger and retrigger immune responses, setting the stage for autoimmune diseases such as lupus, multiple sclerosis, and scleroderma. The result is cellular chaos, and what is even

more disturbing is that this process may be happening year after year without our even being aware of it.

This chronic inflammatory response breaks down healthy tissue in a misdirected

attempt at repair and healing.

Doctors who specialize in rheumatoid arthritis, multiple sclerosis, lupus, and other autoimmune disorders are very familiar with what happens when the body goes to war with itself.

These diseases demonstrate a direct inflammatory attack against healthy cells in places such as the joints, nerves, and connective tissue.

Atherosclerosis is caused by chronic inflammation, which often begins very early in life. The big dispute among experts is what causes the inflammation in the first place. One theory holds that bacteria and viruses may cause this inflammation, but clearly we know that lead, mercury, monosodium glutamate (MSG), fluoride, and other toxic chemicals can also cause inflammatory reactions in blood vessels.

Recent advances in the field of cardiovascular medicine have emphasized the involvement of inflammation in the formation of atherosclerotic plaque.

This chapter represents basic research into the nature of inflammation. It looks beyond the pharmaceutical companies,

beyond aspirin and other multipurpose experimental drugs that block inflammation but not without collateral damage. Magnesium is at the heart of the inflammatory process; it is the prime first cause when it is not present in sufficient quantities.

Increases in extracellular magnesium concentration cause a decrease in the inflammatory response while reduction in the extracellular magnesium results in inflammation. Inflammation causes endothelial dysfunction and activated endothelium 20 20

facilitates adhesion and migration of cancer cells. 77 74

Chronically inflamed tissues continue to generate signals that attract leukocytes from the bloodstream.

When leukocytes migrate from the bloodstream into the tissue, they amplify the inflammatory response.

Magnesium literally puts the chill on inflammation , especially when used transdermally. Heart disease begins with inflammatory chemicals that rage like a fever through your blood vessels. Cool the heat by getting the recommended daily minimum of magnesium, suggest Medical University of South Carolina researchers. They measured blood inflammation levels using the C-reactive protein (CRP), testing 3,800 men and women, and found that those who got less than 50 percent of the RDA (310-420 mg) for magnesium were almost three times as likely to have dangerously high CRP levels as those who consumed enough. Being over age 40, overweight, and consuming less than 50 percent of the RDA more than doubled the 20 20

risk of blood-vessel-damaging inflammation. 77 75

The magnesium intake of a total of 11,686 female health professionals who were younger than 45 and had not had heart and blood vessel disease, a stroke, or cancer was studied in 2005 by 20 20

Dr. Y. Song and colleagues. 77 76 Prior to this only a few studies had been done to see whether magnesium intake is related to inflammation in the body. The researchers wanted to know if women who have more magnesium in their diet or take magnesium supplements had a lower risk of inflammation and the metabolic syndrome.

Women who got more magnesium in their diet were less likely to have the metabolic syndrome, inflammation in the body, and heart and blood vessel disease. Women who had the highest magnesium intake had 12 percent lower C-reactive protein levels than women with the lowest magnesium intake. This study shows that the magnesium found in a healthy, well-balanced diet can protect the body against inflammation and high blood

glucose, conditions that can lead to type 2 diabetes and heart and blood vessel disease.

Chronic inflammation destabilizes

cholesterol deposits in the coronary arteries,

leading to heart attacks and strokes.

A study performed on 10,000 U.S. veterans by the VA Administration and published in the Journal of American Dietetic Association , 1998 showed that most coronary heart disease started as an endothelial infection and in most cases was caused by pathogens. Recognizing the role of inflammation in arteriosclerosis represents a huge paradigm shift for cardiologists. The American College of Cardiology, the American College of Physicians, and the American Heart Association largely ignore the involvement of inflammation in heart attacks and strokes and certainly they ignore unresolved psycho-emotional trauma, as well as the toxic buildup of mercury, which can lead to massive heart failure and sudden death even in the healthiest athlete.

Inflammation not only further damages the artery walls, leaving them stiffer and more prone to plaque buildup, but it also makes any plaque that's already there more fragile and more likely to burst.

A 2006 issue of the Journal of the American College of Nutrition published an article showing that as consumption of magnesium falls, the level of C-reactive protein goes up. C-reactive protein (CRP) is produced in the liver and has emerged as a strong predictor of clinical events of cardiovascular diseases, such as heart attacks and stroke, even in cases where cholesterol levels may be normal. For this reason, CRP assays may become a routine part of blood tests for determining CVD risk. CRP levels in the blood are normally undetectable or very low; high levels are strongly associated with inflammation.

Inflammation is the missing link to explain the role of magnesium in many pathological conditions.



This new view of inflammation is changing the way some doctors practice, but most cardiologists are still not ready to recommend that the general population be screened for inflammation levels.

Cardiologists don't know it but when in rare instances they test for serum magnesium levels, they are not measuring anything but strictly controlled magnesium levels in the blood. There continues to be a blind spot the size of the Gulf of Mexico in cardiologists' perceptions. They just are not able to get to the bottom of the inflammation story—magnesium deficiency.

Magnesium decreases swelling and is effective 20 20

in the treatment of inflammatory skin diseases. 77 77

Scientists at the Joslin Diabetes Center in Boston have bred a strain of mice whose fat cells are supercharged inflammation

factories. "We can reproduce the whole syndrome (diabetes) just by inciting inflammation," Dr. Steve Shoelson says. This suggests that a well-timed intervention in the inflammatory process might reverse some if not all the effects of diabetes. Some of the drugs that are already used to treat the disorder, like metformin, may work because they also dampen the inflammation response. In addition, preliminary research suggests that high CRP levels indicate a greater risk of diabetes.

Whatever makes us become less efficient at using insulin is going to aid in the development of diabetes. Treatments for diabetes work by replacing insulin, boosting its production, or helping the body make more efficient use of the hormone.

The use of magnesium as an anti-inflammatory makes magnesium absolutely indispensable to not only heart patients but also to diabetics, neurological and cancer patients as well. The treatment of chronic inflammation has been problematic for medical science because most of their pharmaceuticals create more inflammation by further driving down magnesium levels.

Virtually all the components of the metabolic syndrome of diabetes, high blood pressure, obesity, and lipid disorders are associated with low magnesium.

Dr. Michael R. Eades

Dr. Eades insists that the entire metabolic syndrome is nothing but a manifestation of a magnesium deficiency. He asks, “Why are so many people deficient in magnesium? Because there is no single food that contains huge amounts of magnesium, and because of that, there is no magnesium lobby. Look at calcium. Thanks to the dairy industry, we are constantly told that we need to get enough calcium, and we’re told right where we can get it. Milk and cheese. Same with vitamin C. The orange juice people never let us forget. Not so with magnesium, so no one really thinks of it.

Another reason that many people are magnesium deficient is that they drink bottled water or softened water. In the old days everyone drank well water or water from streams, both of which contain large amounts of magnesium. Magnesium is removed when water is softened, and it isn’t in large amounts in most of the bottled waters that are available.”

Inflammation contributes to the pro-atherogenic changes in lipoprotein metabolism, endothelial dysfunction, thrombosis, hypertension; this explains the aggravating effect of magnesium deficiency on the development of metabolic syndrome.

Dr. Andrzej Mazura 20 20

Dr. Andrzej Mazur, et al. 77 78 have shown that rats with experimentally-induced magnesium deficiency develop, after only a few days, a clinical inflammatory syndrome that is characterized by leukocyte (white blood cell) and macrophage activation, release of inflammatory cytokines, and excessive production of free radicals. “Magnesium deficiency induces a systemic stress response by activation of neuro-endocrinological pathways,”

writes Dr. Mazur. “ Magnesium deficiency contributes to an exaggerated response to immune stress, and oxidative stress is the consequence of the inflammatory response, ” he continues.

Long-term air pollution exposure is associated with neuroinflammation, an altered innate immune response, disruption of the blood-brain barrier, ultrafine particulate deposition, and accumulation of amyloid beta-42 and alpha-synuclein in children 20 20

and young adults. 77 79

Magnesium-deficient rats develop

20 20

a generalized inflammation. 78 70

Dr. Sophie Begona

It turns out that statins don't just lower cholesterol levels; they also reduce inflammation . The lipid hypothesis of heart disease is rapidly being supplanted by the inflammatory hypothesis. The researchers who have spent their careers doing cholesterol research are falling further and further into disfavor as most scientists are showing graphs demonstrating that elevated cholesterol in combination with an elevated C-reactive protein is a better gauge of heart disease risk. It seems that without the inflammation, elevated cholesterol is not a threat after all.

Inflammation is a response from our immune systems to irritants.

For example, if you sprain your ankle, your immune system creates a protein called a circulating immune complex (CIC). The CIC

travels down to the injured ankle and causes pain and swelling.

The pain you feel is for the purpose of informing you of the injury or damage. And the swelling is protective as it prevents you from moving it and causing more irritation. This is also the body's way of running to the

problem with fresh blood, antibodies, and vital cells in order to begin healing and repairing the damage.

The body then produces proteolytic enzymes that counteract the inflammation, and things return to normal. That's why a sprained ankle in a young child heals within a few weeks at most, but in a middle-aged adult can take six weeks or more. The problem is, after around age 25, our production of these enzymes drops off almost completely so there is nothing to tell the body to stop the inflammation. These enzymes are also responsible for cleaning

the blood, fighting off viral and bacterial infections, and breaking down excess fibrin (scar tissue). Most, if not all, of these enzymes are mediated by magnesium, meaning as magnesium levels drop off so do the activities of these crucial biological magnesium-sensitive enzymes.

Enzymes break down scar tissue and fibrosis. Fibrosis is scar tissue that builds up in our bodies and over time creates so much restriction and strain on our organs that they can no longer function properly. Enzymes also clean the blood of excess fibrin that causes the blood to thicken, which sets us up for clots, which can cause heart attack or stroke. Enzymes also help take some of the strain off of the liver by keeping the blood clean and not allowing it to thicken beyond normal. Enzymes are very important in inflammation; the fundamental supporter of enzymes is magnesium.

### Magnesium, Inflammation & Pain

When I received the following account from my research assistant Claudia French, who is an RN in an acute care psychiatric hospital, I realized that we should address the issue of magnesium, inflammation, and pain more directly.

Yesterday I witnessed one of the most amazing benefits of transdermal magnesium I have seen. I work with another RN who is afflicted with arthritis, especially in her hands, and frequent muscle cramping/spasms in her legs. She has been using magnesium but became lax. Before leaving for work yesterday I received a phone call from her begging me to please bring

with me some magnesium oil, as her hands were so cramped up and painful that she could barely stand to continue working.

When I got there, her hands and fingers were very contorted in spasm. Her fingers were curled up and stiff and her legs were cramping badly. She reported they had been this way all day, and the pain was driving her to tears. She immediately slathered the magnesium oil all over her hands. We were in report and she wanted it on her hands right away so the entire nursing staff watched and within five minutes you could visibly see her fingers extend back to normal and the finger movement return. We could literally see the relaxation taking place. It was simply amazing.

Within minutes her hands were completely relaxed and functional again and stayed that way the remainder of the evening. She also applied the magnesium to her legs and found relief.

About 30 minutes after applying the oil, she held up her hands for everyone to see, and showed us the arthritic nodules on some fingers. She described how painful these always are to touch. But she poked and prodded them telling us how there was no pain now.

She was able to continue working and doing the extensive writing that is a large part of our work without any further discomfort.

Pain relief and muscle relaxation for people with arthritis and muscle cramping is an important and significant benefit of magnesium oil. The rapid relief visible to us all was really amazing! The following day she reported that she'd gotten the first restful night of sleep in many days. The pain was not waking her up.

Claudia French, RN, LPHA

What is essential to remember about treating pain with magnesium is that it treats both the symptom and the cause of pain—meaning the cause of the pain can often be traced back to a magnesium deficiency.

There are not too many medicinal substances or medicines that can make this claim. It should be noted that pain management with magnesium

employs magnesium chloride applied transdermally to the skin. Dr. Linda Rapson, who specializes in treating chronic pain, believes that about 70 percent of her patients who complain of muscle pain, cramps, and fatigue are showing signs of magnesium deficiency. “Virtually all of them improve when I put them on magnesium,” says Rapson, who runs a busy Toronto pain clinic. “It may sound too good to be true, but it’s a fact.” She’s seen the mineral work in those with fibromyalgia, migraines, and constipation. “The scientific community should take a good hard 20

look at this.” 78<sup>1</sup>

Lynne Suo is one of Dr. Rapson’s patients. She had been using painkillers and steroids for years to try to ease the pain of her arthritis and fibromyalgia. Dr. Rapson started her on 675 units of magnesium a day. Within days, Suo called Dr. Rapson to report a surprising change. “I went from being in constant pain almost throughout the day and night to having moments of pain. And for me that was a huge improvement,” says Suo, a former college English teacher. She dismisses suggestions that the change is a placebo effect. “I was not one day without pain and now I don’t have to take heavy pain medication,” she reports.

The granddaddy of all anti-inflammatories is aspirin, which can cause serious problems. Most pain and anti-inflammatory medications are not safe; even the over-the-counter pain medications hold unforeseen dangers. Despite more than a decade’s worth of research showing that taking too much acetaminophen can ruin the liver, the number of severe, unintentional poisonings 20

from the drug is on the rise, a new study reports. 78<sup>2</sup> The drug acetaminophen is best known under the brand name Tylenol.

Compounds containing Tylenol include Excedrin, Midol Teen Formula, Theraflu, Alka-Seltzer Plus Cold Medicine, and NyQuil Cold and Flu, as well as other over-the-counter drugs and many prescription narcotics like Vicodin and Percocet.

Magnesium chloride, when applied directly to the skin, is transdermally absorbed and has an almost immediate effect on chronic and acute pain.

## 1. Calcium Poisoning

Too much calcium will cause heart failure.

Calcium is essential to health, yet it holds a hidden danger that brings us to our graves much quicker than we would like. Calcium is the most promoted nutrient by proponents of conventional, nutritional, and alternative medicine. This is a great and tragic mistake. They should instead be promoting magnesium. Magnesium deficiency leads to an increase in myocardial levels of both sodium and calcium. This is a problem because coronary artery (CA) calcium is a predictor of near-term coronary heart disease events. In the face of growing magnesium deficiencies, calcium becomes increasingly more toxic to human physiology.

The average American consumes only 40 percent of the recommended daily allowance of magnesium. Eighty to 90 percent of the U.S. population is magnesium deficient.

Dr. Dean makes this clear when she says in her book, *The Magnesium Miracle*, “To understand how you can create a calcium/

magnesium imbalance in your own body, try this experiment in your kitchen. Crush a calcium pill and see how much dissolves in one ounce of water. Then crush a magnesium pill and slowly stir it into the calcium water. When you introduce the magnesium, the remaining calcium dissolves; it becomes more water-soluble. The same thing happens in your bloodstream, heart, brain, kidneys, and all the tissues in your body. If you don’t have enough magnesium to help keep calcium dissolved, you may end up with calcium-excess muscle spasms, fibromyalgia, hardening of the arteries, and even dental cavities. Another scenario plays out in the kidneys. If there is too much calcium in the kidneys and not enough magnesium to dissolve it, you can get kidney stones.”

The more protein you consume, the more

magnesium you need. When you consume large amounts of calcium, you need more magnesium. A diet high in calcium increases the body’s need for magnesium.

Dr. H. Ray Evers

Magnesium and calcium work together to control muscle action, though calcium becomes a problem when there is not enough magnesium to control calcium's actions. Calcium becomes a slow-

acting poison (often decades of buildup) to tissues all over the body when in excess relative to magnesium. Symptoms of trace mineral excess or deficiency depend on their ratios to other elements. In the event of calcification, it is not particularly a high calcium level that results in the formation of a stone or spur, but calcium being high in ratio to magnesium.

Magnesium increases the solubility of calcium in the urine.

Supplementing magnesium to the diet has demonstrated significant effect in preventing recurrences of kidney stones.

Unabsorbed calcium can lodge anywhere in our body. For instance, if it lodges in your bones and joints, it mimics arthritis; if it lodges in your heart, it mimics arterial lesions; it mimics respiratory problems if it lodges in your lungs, etc. As a general rule, acid substances tighten; alkaline substances relax.

Magnesium is alkaline and relaxes the body from tightness, tension, stiffness, spasms, twitches, tics, or jerkiness as a result of nervousness, anxiety, anger, fear, or agitation.

Magnesium acts as natural gate or valve in the brain synapses that regulates influx of calcium into postsynaptic calcium channels from presynaptic neurons in parts of the brain that are involved in mood and behavior such as the hippocampus. With inadequate magnesium (calcium toxicity), this function becomes altered, resulting in irritability, anxiety, depression, ADHD, mania, hypomania, bi-polar disorder, hyper-excitability, hyperemotuality, and/or perhaps some psychoses.

Magnesium taken in proper dosages can

solve the problem of calcium deficiency.



Dr. Nan Kathryn Fuchs

A healthy cell has a high magnesium and low calcium level. The higher the calcium level and the lower the magnesium level in the extra-cellular fluid, the harder is it for cells to pump the calcium out. The result is that with low magnesium levels the mitochondria gradually calcify and energy production decreases.

Mitochondria are the little powerhouses found within most cells and are responsible for producing most of the body's energy. This is vitally important for the heart because heart muscle cells have a never-ending need for energy. Mitochondria are also important for proper neurotransmission and are highly concentrated in cells of the brain and central nervous system.

Up to 30 percent of the energy of cells is used to pump calcium out of the cells.

Dr. H. Ray Evers writes, "The power plant of human cell is called the mitochondrion . The mitochondrion is what generates energy

for the cell to use. What everyone refers to as 'energy' is derived from the oxidative reduction of the cellular respiration.

This is done through the mitochondria. But the problem arises when the cell is low in magnesium relative to calcium. Adenosine triphosphate, the 'energy currency' of the cell, is magnesium-dependent. This means it is obvious that the calcium pump at the cell membrane is also magnesium-dependent. Without enough

'biologically available' magnesium, the cellular calcium pump slows down. Thus a vicious cycle is established. The low levels of available magnesium inhibit the generation of energy and the low levels of energy inhibit the calcium pump. The end result?

The mitochondrion, the powerhouse of the cell and the entire body, becomes calcified. This is the beginning of aging. Every function of your body can be inhibited when the mitochondria calcify. "

We may say that our biochemical age is determined by the ratio of magnesium to calcium within our cells.

Deficiency in magnesium, aside from having a negative impact on the energy production pathway required by mitochondria to generate ATP, also reduces the threshold antioxidant capacity of the cardiovascular system and its resistance to free-radical damage. Magnesium acts as an antioxidant against free radical damage of the mitochondria. Magnesium has been called nature's

“calcium channel blocker” because of its ability to prevent coronary artery spasm and arrhythmias and to reduce blood pressure.

The ratio of calcium to magnesium is vital for cell membranes and the blood-brain barrier.

Calcium enters the cells of the heart by way of calcium channels that are jealously guarded by magnesium. Magnesium, at a concentration thousands of times greater than that of calcium in the cells, allows only a certain amount of calcium to enter to create necessary electrical transmissions, and then immediately helps to eject the calcium once the work is done. Why? If calcium accumulates in the cell, it causes hyperexcitability and calcification, and disrupts cell function leading to angina, high blood pressure, arrhythmia, asthma, headaches, and even heart attacks.

Dr. Garry Gordon wrote, “If you have compromised cell membranes or low ATP production for any reason, then the cell has trouble maintaining the normal gradient. This is because the usual gradient is 10,000 times more calcium outside of cells than inside; when this is compromised you will have increased intracellular calcium, which seems to always happen at the time of death. Whenever intracellular calcium is elevated, you have a

relative deficiency of magnesium, so whenever anyone is seriously ill—acute or chronic—part of your plan must be to restore magnesium, which is poorly absorbed through oral means.”

The adverse effects of excessive calcium intake may include high blood calcium levels, kidney stone formation, and kidney 20

complications. 78<sup>3</sup> Elevated calcium levels are also associated with arthritic/joint and vascular degeneration, calcification of soft tissue, hypertension and stroke, in addition to increase in VLDL triglycerides, gastrointestinal disturbances, mood and depressive disorders, chronic fatigue, and general mineral imbalances including magnesium, zinc, iron and phosphorus. High calcium levels interfere with vitamin D and subsequently inhibit the vitamin's cancer protective effect unless extra amounts of 20 20

vitamin D are supplemented . 78 74

Cardiovascular calcification lesions can lead to the development of myocardial ischemia, myocardial infarction, impaired myocardial function, congestive heart failure, cardiac valve insufficiency, and cardiac arrhythmias. There is a strong association between increased cardiac calcification and risk of death. Administration of vitamin D to treat secondary hyperparathyroidism increases intestinal absorption of calcium and phosphorus, and raises serum calcium and phosphorus levels. Soft-tissue and vascular calcification is associated with a history of 20 20

vitamin D therapy. 78 75

Magnesium and calcium share a common route of absorption in the intestinal tract and appear to have a mutually suppressive effect on each other. If calcium intake (or dairy intake) is unusually high, calcium will be absorbed in preference to magnesium. Also, excessive doses of vitamin D and calcium supplements can cause renal magnesium loss. Sunlight is the only safe way to get vitamin D since the body regulates how much is made. Take it by pill form and calcium homeostasis is overridden.

Coronary artery calcification is common, severe, and significantly associated with ischemic cardiovascular disease in 20 20

adult end-stage renal disease patients. 78 76 The amount of calcium in the coronary arteries reliably predicts heart attack risk and is measured by what

is called one's calcium score. UCLA cardiologist, Dr. Matt Budoff, a long-time champion of the coronary calcium scan and author of the AHA paper says, "The total amount of coronary calcium (Agatston score) predicts coronary disease events beyond standard risk factors." The coronary calcium score is a precise quantitative tool for measuring and tracking heart disease risk and is more valuable and accurate than other traditional markers (such as total cholesterol, which is practically worthless as a heart disease risk marker).

Getting your calcium/magnesium balance corrected is essential for normalizing heart rate. Irregular heart rate can be a sign of either too little calcium or too little magnesium; the key to

knowing whether you need calcium or magnesium is the strength of the heart beat, not the speed or the irregularity—if it's too strong, take more magnesium; if it's too weak, take more calcium.

For most people though it will be more magnesium that is the real need.

According to the University of Florida Shands Cancer Center, a 20 20

high level of calcium in the blood, called hypercalcemia, 78 77 may become a medical emergency. This disorder is most commonly caused by cancer or parathyroid disease, but underneath the primary etiology is a magnesium deficiency. Hypercalcemia is commonly attributed to cancer treatment. Severe hypercalcemia is a medical emergency that can be avoided if magnesium levels are brought up to normal.

Magnesium is the mineral of rejuvenation and prevents the calcification of our organs and tissues that is characteristic of the old-age-related degeneration of our body.

Magnesium inadequacy interferes with cellular metabolism and accelerates the aging of most human tissues. Most human cells can only replicate a limited number of times in cultures before they lose the ability to divide, a phenomenon known as replicative senescence. Recent studies have shown that in cultures low in magnesium, the senescence of human endothelial cells and 20 20

fibroblasts is accelerated. 78 Dr. James Howenstine says,

“Calcification in cellular tissues is a sign of tissue damage, cellular aging, and impending cell death. When cells are unable to regulate calcium and keep the calcium content of cells down, cellular function degenerates. Calcified arteries, calcium in soft tissues, and high levels of calcium within cells are all signs of aging. At age 80 the average calcium content in the aorta is 140 times greater than the levels of aortic calcification noted at age 40.”

Magnesium deficiency leads to an increase in myocardial levels of both sodium and calcium.

Adequate levels of magnesium are essential for the heart muscle.

Those who die from heart attacks have very low magnesium but high calcium levels in their heart muscles. Magnesium and calcium work together as “paired minerals” to control muscle action, though calcium becomes increasingly toxic in the face of any kind of magnesium deficiency.

Calcium affects muscle contractions; magnesium balances that effect and relaxes muscles. Calcium tightens the muscles; magnesium relaxes the muscles. With insufficient magnesium the muscles stay tense and eventually the muscles may cramp. This

could happen when you have too much calcium or too little magnesium. Too much calcium causes the heart to go into a spasm and it can't relax. This is a heart attack. Get some magnesium into the body and the heart will slowly start returning to normal unless major damage has already been done. Add iodine and selenium and we have the makings of an ideal formula to support recovery and possibly even minor tissue regeneration.

Coronary artery calcium is a predictor of near-term coronary heart disease events.

In young people there is minimal plaque formation. However, with passage of time the plaque increases. About 20 percent of this plaque volume

contains calcium that is measurable on CAT scan, providing a marker for the total plaque burden. Calcification of atherosclerotic lesions is due to a process of active deposition of calcium in the atherosclerotic plaque that utilizes metabolic pathways similar to those found in normal human bone. Calcium accumulates steadily in plaque and its presence is verifiable via microscopic examination from the very early stages of disease formation.

Patients with coronary heart disease who have been treated with large amounts of magnesium survive better than those treated with drugs. Magnesium dilates the arteries of the heart and lowers cholesterol and fat levels.

The most common cause of death in dialysis patients is cardiovascular disease. This is due in part to the presence of excess vascular calcification, particularly in the form of extensive coronary artery calcification, which can be observed 20 20

even in very young dialysis patients. 78 79 The presence of coronary artery calcification in the dialysis population appears to correlate in part with the ingested quantity of calcium-20 20

containing oral phosphate binders. 79 70

The associations among valvular calcification, inflammation, carotid atherosclerosis, and arterial calcification suggest that valvular calcification is a marker of atherosclerosis and arterial calcification in patients with end-stage renal disease.

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79 <sup>1</sup>

Dietary surveys clearly show that intakes of magnesium, not calcium, have been falling over the last 50 years. This is a problem because without enough magnesium, calcium will collect in the soft tissues. It is magnesium that controls the fate of calcium in the body. If magnesium is insufficient, calcium will be deposited in the soft tissues (kidneys, arteries, joints,

brain, etc.). Calcium intakes above 2.6 grams per day may reduce the uptake and utilization of magnesium by the body, and excessive calcium intakes increase magnesium requirements.

Countries with the highest calcium-to-magnesium ratios (high calcium, low magnesium) in soil and water have the highest incidence of cardiovascular disease. At the top of the list is Australia. In contrast, in Japan with its low cardiac death rate, the daily magnesium intake was cited as high as 560 milligrams.

Some researchers predict that the American ratio of calcium to magnesium is actually approaching 6-to-1, yet the recommended dietary ratio of calcium to magnesium in the United States is 2-to-1. Current research on the Paleolithic or caveman diet shows that the ratio of calcium to magnesium in the diet in which our 20

bodies evolved is 1-to-1.<sup>792</sup> Balancing this information is the fact that mother's breast milk is ten parts calcium to only one part magnesium, so it seems that at least early in life we need less magnesium and more calcium to build strong bones.

A diet high in dairy and low in whole grains can lead to 20

excess calcium in the tissues and a magnesium deficiency.<sup>793</sup>

Dr. Nan Kathryn Fuchs

Author of The Nutrition Detective

Medical authorities claim that the widespread incidence of osteoporosis and tooth decay in western countries can be prevented with a high calcium intake. However the opposite is true. Asian and African populations with a very low intake of about 300 mg of calcium daily have very little osteoporosis.

Bantu women with an intake of 200-300 mg of calcium daily have the lowest incidence of osteoporosis in the world. In western countries with a high intake of dairy products, the average calcium intake is about 1000 mg.

It is magnesium that actually controls bone density, not calcium. Magnesium drives the calcium into the bones whereas low levels of magnesium encourage the loss of calcium.

Because of the totally distorted way medical science relates to magnesium, the medical profession makes mistakes with calcium.

It's still common to hear the assumption about calcium's ability to help prevent osteoporosis (weakening of the bones usually associated with aging). The fact is that it's the increasing of 20 20

magnesium intake that increases bones density 79 74 in the elderly and reduces the risk of osteoporosis. "Higher magnesium intake through diet and supplements was positively associated with whole-body bone mineral density (BMD) in older white men and

women. For every 100 mg per day increase in magnesium, there was 20 20 an approximate two percent increase in whole-body BMD," 79 75 said Dr. Kathryn Ryder.

"Bones and teeth average about one percent phosphate of magnesium. Elephant tusks contain two percent of phosphate of magnesium and billiard balls made from these are almost indestructible. The teeth of carnivorous animals contain nearly five percent phosphate of magnesium and thus they are able to crush and grind the bones of their prey without difficulty,"

wrote Otto Carque (1933) in Vital Facts About Foods .

One of the most important aspects of the disease osteoporosis has been almost totally overlooked.

That aspect is the role played by magnesium.

Dr. Lewis B. Barnett

Dr. Karen Kubena, associate professor of nutrition at Texas A&M



University, indicates that even if you monitor your magnesium level like a maniac, you're still at risk for migraines if your calcium level is out of whack. It seems that higher than normal blood levels of calcium cause the body to excrete the excess calcium, which in turn triggers a loss of magnesium. "Let's say you have just enough magnesium and too much calcium in your blood. If calcium is excreted, the magnesium goes with it. All of a sudden, you could be low in magnesium," says Dr. Kubena.

## Prostate Cancer & Calcium

"There is reasonable evidence to suggest that calcium may play an important role in the development of prostate cancer," says Dr.

Carmen Rodriguez, senior epidemiologist in the epidemiology and surveillance research department of the American Cancer Society (ACS). Rodriguez says that a 1998 Harvard School of Public Health study of 47,781 men found those consuming between 1,500 and 1,999

mg of calcium per day had about double the risk of being diagnosed with metastatic prostate cancer (cancer that has spread to other parts of the body) as those getting 500 mg per day or less . And those taking in 2,000 mg or more had over four times the risk of developing metastatic prostate cancer as those taking in less than 500 mg.

The recommended daily allowance (RDA)

of calcium is 1,000 mg per day

for men and 1,500 mg for women.

Later in 1998, Harvard researchers published a study of dairy product intake among 526 men diagnosed with prostate cancer and 536 similar men not diagnosed with the disease. That study found a 50 percent increase in prostate cancer risk and a near doubling

of risk of metastatic prostate cancer among men consuming high amounts of dairy products, likely due, say the researchers, to the high total amount of calcium in such a diet. The most recent Harvard study on the topic,

published in October 2001, looked at dairy product intake among 20,885 men and found men consuming the most dairy products had about 32 percent higher risk of developing prostate cancer than those consuming the least. Dr.

Panagiota N. Mitrou of the National Cancer Institute, Rockville, Maryland and colleagues found the same thing—that increased consumption of calcium and dairy products raises the risk of prostate cancer.

Calcification & Its Treatment:

Magnesium & Sodium Thiosulfate

There are no pharmaceutical drugs on the market to reduce calcium deposits, but magnesium chloride and sodium thiosulfate are useful in preventing and treating unwanted calcification.

Together they offer the best way of combating the calcium time bomb going silently and slowly off in uncounted millions of people.

Sodium thiosulfate (STS) is a calcium chelating agent with antioxidant properties.

Dr. Carlos E. Araya

The beneficial effects of sodium thiosulfate (STS) are thought to be due in part to its ability to enhance the solubility of calcium deposits. STS has a small molecular weight of 248

( $\text{Na}_2\text{S}_2\text{O}_3$ ) and, in patients with normal renal function, has a serum half-life of 15 minutes. STS facilitates the mobilization of calcium from vessels affected by calcium deposits. Sodium thiosulphate results in the formation of calcium thiosulphate in the urine, a compound with much higher solubility than the other calcium salts (phosphate, oxalate). Thus, sodium thiosulphate may not only inhibit further nephrocalcinosis, but in some degree it 20 20

may also contribute to decalcification of renal parenchyma. 79 76

Intravenous STS seems beneficial, has mild adverse effects, and is well tolerated in children and young adults.

STS dosage was 25 g/1.73 m<sup>2</sup> per dose intravenously.

Dr. Carlos E. Araya

### Body pH & Calcium

One of the first warning signs of an acidic biological terrain is calcium deposits. Simply put, excess acidity equals soft-tissue calcifications. A urine pH of less than 5.3 indicates an inability to assimilate vitamins or minerals. Due to the

alkalinity of minerals, they loosen tumors, including fibroid tumors, endometriosis, cysts, moles, warts, skin tags, and other growths, and cause them to release their toxins. Magnesium and sodium bicarbonate should be used to buffer acid pH, not the calcium that is being leached from the bones.

The chemical reaction of magnesium is

alkaline (acid-binding). It regulates the acid-alkaline balance of the body.

Dr. H. Ray Evers

Many alternative health care professionals believe there is only one disease. And that disease is acidosis. The wastes produced from food are highly acidic, and acidosis is one of the main contributors that lead to the aging process and various illnesses. Acid waste is excreted from the human body in the form of urine or sweat. But the wastes not excreted will be circulating around in the blood within the body. This acidic waste will gradually accumulate somewhere in our capillary blood vessels and eventually clog them up. Also, as a consequence of this, the cells will be deprived of their supply of oxygen and essential nutrients, rendering these cells inactive in reproduction. That's the main reason why people age. Moreover, with the capillary blood vessels clogged up, the function of every organ in the body that's accumulating acidic waste will begin to deteriorate, causing serious illnesses in the long run.

Mild acidosis can cause such problems as: Cardiovascular damage, including the constriction of blood vessels and the reduction of oxygen

Weight gain, obesity , and diabetes

Bladder and kidney conditions, including kidney stones Immune deficiency

Acceleration of free radical damage, possibly contributing to cancerous mutations

Premature aging

Osteoporosis, weak, brittle bones, hip fractures , and bone spurs Joint pain, aching muscles , and lactic acid buildup Low energy and chronic fatigue

The more acidic we become, the harder it is for oxygen to be present and so our biological terrain also becomes more anaerobic. Without adequate oxygenation, unfriendly bacteria,

viruses, molds, and fungi live and prosper. Then our cells cannot carry on their life-giving functions in a very efficient manner because our biological chemical reactions need oxygen.

Calcium and magnesium are opposites in their effects on our body structure. As a general rule, the more rigid and inflexible our body structure is, the less calcium and the more magnesium we need.

Despite the crucial relationship between calcium and magnesium, a recently published study announced that most U.S. children don't get enough calcium in their diets, and pediatricians should intervene to help remedy the problem. These guidelines were issued in February 2006 by the American Academy of Pediatrics.

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79 77 The proportion of children who receive the recommended amounts of calcium declines dramatically after the second year of life, reaching rock bottom during adolescence, said Dr. Nancy F.

Krebs, of the University of Colorado in Denver, who headed the academy committee that wrote the guidelines.

Magnesium status is important for regulation of calcium balance through parathyroid

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hormone-mediated reactions. 79 78

Despite the fact that serum levels of magnesium are not the best indicator of adequate magnesium levels, some studies have shown that when magnesium deficiency was induced in humans, the earliest sign was decreased serum magnesium levels (hypomagnesemia). Over time serum calcium levels also began to decrease (hypocalcemia) despite adequate dietary calcium.

Hypocalcemia persisted despite increased parathyroid hormone (PTH) secretion. Usually, increased PTH secretion quickly results in the mobilization of calcium from bone and normalization of blood calcium levels. As the magnesium depletion progressed, PTH

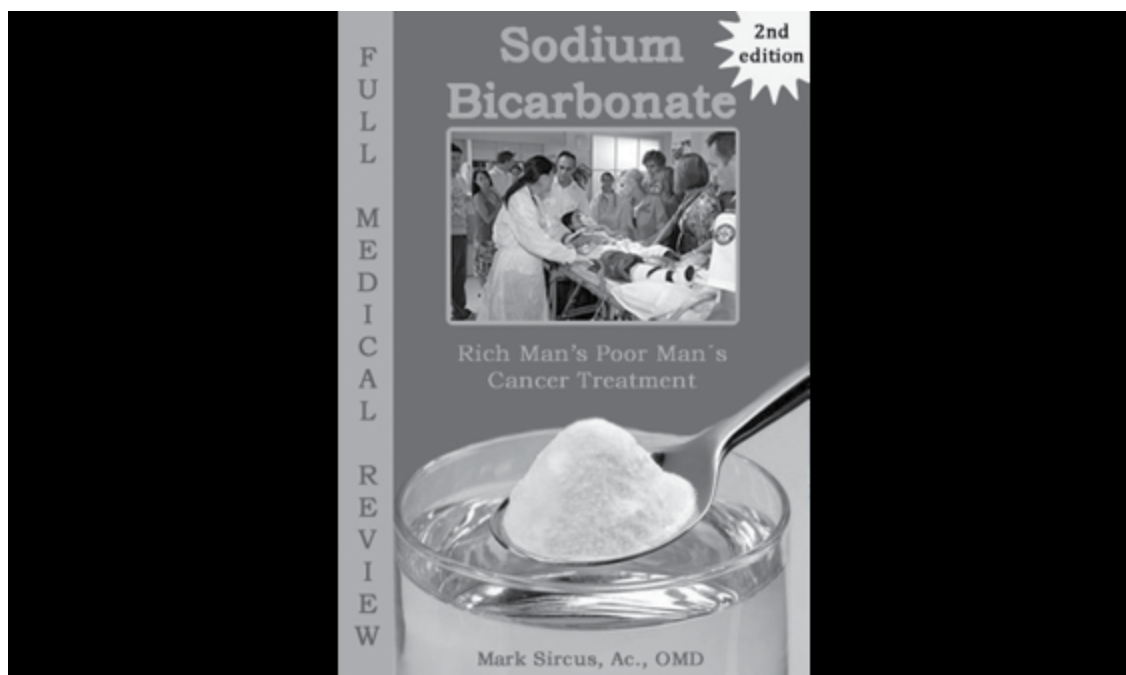
secretion diminished to low levels. Along with hypomagnesemia, signs of severe magnesium deficiency included hypocalcemia, low serum potassium levels (hypokalemia), retention of sodium, low circulating levels of PTH, neurological and muscular symptoms (tremor, muscle spasms, tetany ), loss of appetite, nausea, 20 20

vomiting, and personality changes. 79 79 Hypercalcemia can cause 20 20

magnesium deficiency and wasting. 170 70

It is medical wisdom that tells us that magnesium is actually the key to the body's proper assimilation and use of calcium as well as other important nutrients. If we consume too much calcium without sufficient magnesium, the excess calcium is not utilized correctly and may actually become toxic, causing painful conditions in the body. Hypocalcemia is a prominent

manifestation of magnesium deficiency in humans (Rude et al., 1976). Even mild



degrees of magnesium depletion significantly decrease the serum calcium concentration (Fatemi et al., 1991).

## 1. The Ultimate Mitochondrial Cocktail

### Magnesium Bicarbonate

There is nothing in mainstream medicine that addresses de-acidification, detoxification, fixing nutritional deficiencies, modulating and boosting the immune system, and increasing full-body circulation. Medical science has failed miserably in its attempts at curing degenerative, metabolic, or autoimmune diseases. Without removing toxins and acids from all organs, cells, and tissues, and without providing the essential nutritional building blocks like magnesium, the body will not be able to heal completely.

Unless a treatment actually removes acid toxins from the body and increases oxygen, water, and nutrients, most medical interventions come to naught. With most allopathic medicines themselves being mitochondrial poisons, they often change the symptom picture, thus almost always

driving disorders into a deeper chronic state. When the body's tissues and cells become too acidic in conjunction with mitochondrial deficiency , we set the stage for tissue inflammation and degeneration as we become breeding grounds for anaerobic pathogens.

It is time for allopathic medicine to understand that viruses, bacteria , and fungi all thrive in acid conditions. Why is this so hard for orthodox doctors to understand? Tissues and cells are like factories with furnace-like mitochondria everywhere , and everything gets very dirty with acid wastes that have to be cleared away every millisecond we are alive. There is no way

around the reality that metabolism creates acid waste that can accumulate quite rapidly under the right conditions.

Increased oxidative stress, which correlates with pH changes almost exponentially into the acidic, is especially dangerous to the mitochondria, which suffer the greatest under oxidative duress.

Many in the alternative health field believe that there is not one drug on the market that reduces the acidity of the body or addresses any kind of nutritional deficiency. This is not true!

There happen to be two exceptional medicines that are excellent in addressing most of the issues mentioned above. Magnesium chloride and sodium bicarbonate are both considered medicines in their injectable forms and both provide almost immediate relief to physiological disturbances.

Patients receiving sodium bicarbonate achieved urine pHs of 6.5 as opposed to 5.6 with those receiving sodium chloride.

This alkalization is theorized to have a protective effect against the formation of free radicals that may cause nephropathy.

Dr. Michael Metro

One of the fundamental approaches to medicine has to be the alkalization of the body so it can dispose acids from our cells

, tissues, and organs. We can do this in many ways , but often doctors have to do this quickly in emergency situations. Other times, when we have cooperative patients , we can use food as medicines and accomplish things gradually with time.

The most powerful alkalizing foods on the planet are the ones that are highest in chlorophyll. You just can't beat the cell-restoring potential of green foods such as wheat, barley, kamut, alfalfa, and oat grasses , along with spirulina and chlorella.

These foods are all high in magnesium and act readily as food medicines. They are thousands of times more powerful than ordinary green vegetables because they are super concentrated in chlorophyll, alkaline minerals, rare trace minerals, vitamins, phyto-nutrients, and enzymes. My favourite has always been spirulina and I include it in all my protocols.

Though I believe in the power of raw food diets and healing medical approaches like the Gerson diet, today we need exceptionally powerful medicinal medicines that are not really medicines in the way we normally think of medicines. Both sodium bicarbonate and magnesium chloride are common items that when not injected are considered foods safe for consumption. Luckily for

everyone , these two substances are affective for chronic and acute disorders when used orally and transdermally; we do not need to go to the emergency room for injections.

This chapter is specifically about the dynamics of using these two substances together. They offer a combination therapy that is natural, effective , and safe , and can be used readily with other protocol items, medicines , and healing processes. Add some sun (vitamin D), iodine, ALA (alpha lipoic acid) , and vitamin C

and we will go a long way toward helping the pharmaceutical giants to an early grave.



Magnesium bicarbonate is a complex hydrated salt that exists only in water under specific conditions. The magnesium ion is  $Mg^{2+}$ , and the bicarbonate ion is  $HCO_3^-$ . So, magnesium bicarbonate must have two bicarbonate ions:  $Mg(HCO_3)_2$ . Magnesium chloride and sodium bicarbonate taken at full strength with water at slightly separated times are an ideal way to supply magnesium ions and bicarbonate ions to body cells.

Magnesium- and bicarbonate-rich mineral waters are easily absorbed and have many health benefits.

Likewise, in small doses, the two together make up an ideal 20

treatment system for distilled and reverse osmosis water. <sup>1701</sup>

Adding these two substances to taste will not only remineralize highly processed water but will also provide the body with a constant supply of the ultimate mitochondrial cocktail. Good drinking water would contain approximately 125 mg of magnesium 20

and 650 mg of bicarbonate per litre. <sup>1702</sup> When consumed together, magnesium chloride and sodium bicarbonate work very well together to combat basic physiological problems.

When our tissues become too acidic and are lacking in magnesium necessary for ATP production, cellular metabolism drops off and this can lead to obesity and diabetes.

Few clinicians are aware how these two substances work to enhance each other—they are mutually reinforcing because magnesium functions as a bicarbonate co-transporter into cells. And bicarbonate acts as a transporter of magnesium into the mitochondria. Magnesium influx is linked with bicarbonate transport according to the Dietary Reference Intakes guide from the Institute of Medicine. Magnesium transport into or out of cells requires the presence of carrier-mediated transport systems 20

(Gunther, 1003; Romani et al., 1993). <sup>1703</sup> ATPase reaction has a broad pH optimum centering on neutral pH, with little significant 20 20

activity above pH 9.0 or below pH 5.5. <sup>170 74</sup> Thus anything that moves us from overall acid conditions toward alkaline that recovers the neutral zone is going to enhance cell metabolism via mitochondrial optimization.

Alkalosis enhances magnesium reabsorption 20 20

in the juxtamedullary proximal nephron. <sup>170 75</sup>

It was actually the dedicated work of Dr. Russell Beckett, a veterinarian with a PhD in biochemical pathology, that paved the way for understanding the significance of bicarbonate acting in conjunction with magnesium. He formulated Unique Water, which, it has been asserted, slowed the aging process and increased the length of life of humans and other mammals, and could be used to treat all inflammatory and degenerative diseases. Unique Water is water containing magnesium bicarbonate at an alkaline pH value.

Dr. Beckett's theoretical and experimental research has resulted in the understanding of how important both bicarbonate and magnesium ions are in human physiology and how they work together to optimize human health and the ability to recover from disease.

Bicarbonate ions working alongside magnesium would naturally create the conditions for increased glucose transport across cell plasma membranes. Bicarbonate ions without doubt create the alkaline conditions for maintaining the enzyme activity of pancreatic secretions in the intestines. Bicarbonate neutralizes acid conditions required for inflammatory reactions; hence sodium bicarbonate would be of benefit in the treatment of a range of chronic inflammatory and autoimmune diseases. An excellent 20 20

research group called Agua G <sup>170 76</sup> is studying the overall benefits of bicarbonate in human physiology.

Bicarbonate acts to stimulate the

20 20

ATPase by acting directly on it. <sup>170 77</sup>

Magnesium does not readily reach the mitochondria, but if plenty of bicarbonate is available, it will act as transport into the mitochondria. The only problem is that the few magnesium bicarbonate products available for sale are expensive compared to using magnesium chloride and sodium bicarbonate individually—and they are almost impossible to find. It is possible to make one's own

magnesium bicarbonate.<sup>170 78</sup> This chapter does not make a strong recommendation for you to go out and buy magnesium bicarbonate or even make it yourself as directed in this last footnote. A person gets much more control over both bicarbonate and magnesium physiology when magnesium is taken in its chloride form and the bicarbonate is taken as sodium bicarbonate. When using magnesium chloride for oral consumption, you must use the

highest quality sources.<sup>170 79</sup> Seawater evaporation magnesium oils are not appropriate for this type of application.

The bicarbonate buffer system occurs in both intra- and extracellular fluids. It consists of carbonic acid ( $\text{H}_2\text{CO}_3$ ) and sodium bicarbonate ( $\text{NaHCO}_3$ ). If a strong acid is present, it reacts with sodium bicarbonate to produce carbonic acid and sodium chloride, minimizing the increasing concentration of hydrogen ions. If a strong base is present, it reacts with

carbonic acid, producing sodium bicarbonate and water, minimizing the alkaline shift.

Highly alkaline water with magnesium,

bicarbonate, calcium and potassium

increases pH significantly in the body.

Carbonic anhydrase (CA) is a ubiquitous metalloenzyme that catalyzes the reversible hydration/dehydration of carbon dioxide.

Carbonic anhydrase enzyme is ever-present in body cells and constitutes up to 10 percent of the soluble protein in most body cells. It is one of the

fastest enzymes known: each carbonic anhydrase enzyme produces from ten thousand to one million acid groups ( $H^+$ ) per second. The acid ( $H^+$ ) produced by carbonic anhydrase enzyme is pumped by proton pump enzymes into cell organelles such as lysosomes, phagosomes, endosomes, and ruffled membranes.

In red blood cells (RBCs), CA is the second most abundant protein to haemoglobin and plays a crucial role in  $CO_2$  transport. More specifically, RBC CA catalyzes the hydration of  $CO_2$  to  $HCO_3^-$  at the tissue site of production, and the dehydration of  $HCO_3^-$  to  $CO_2$  at the respiratory surface, thereby facilitating the 20

transport and excretion of  $CO_2$  from the body.<sup>1170</sup> In addition, RBC CA also facilitates the linkage of  $O_2$  and  $CO_2$  transport via the Bohr effect.<sup>111</sup> Carbonic anhydrase speeds the reaction of carbon dioxide and water. This reaction produces carbonic acid, which quickly dissociates into bicarbonate and hydrogen ions.

Bicarbonate ion concentrations decrease the formation of acid by carbonic anhydrase enzyme (Le Chatelier's principle). In the presence of magnesium and bicarbonate ions, less acid is produced by carbonic anhydrase enzyme.<sup>112</sup> But studies with partially purified carbonic anhydrase from spinach (*Spinaciaoleracea* L.) chloroplasts show that the effect was the result of the chloride ion and not the magnesium ion. Enzyme activity was reduced 50

percent upon addition of 3-10 millimolar  $MgCl_2$  or  $KCl$  while all additions of  $MgSO_4$  between 0.3 and 10 millimolar were mildly stimulatory.<sup>113</sup>

Excess acid accumulation leads to oxygen deprivation and thus cell fermentation. Acid conditions lead to cell rot, another term for cancer.

This reaffirms my long-standing belief that magnesium chloride is the absolute best form of magnesium since, among many reasons, the very important chloride ion is supplied. Chloride physiology is just one more basic that is being addressed. It is important because we see reduced acid through reduced carbonic anhydrase enzyme action. Chloride is required to produce a large quantity

of gastric acid each day and is also needed to stimulate starch-digesting enzymes.

Using other magnesium salts is less advantageous because these have to be converted into chlorides in the body anyway. We may use magnesium as oxide or carbonate but then we need to produce additional hydrochloric acid to absorb them. Many aging individuals, especially with chronic diseases who desperately need more magnesium, cannot produce sufficient hydrochloric acid; and then they cannot absorb the oxide or carbonate.

Dr. David Brownstein tells us (importantly), “Chloride and bromine compete for reabsorption in the kidneys. When there is a decreased amount of chloride in the body (which is common in low-salt diets), less bromine will be excreted from the kidneys resulting in elevated bromine levels. Increasing the amount of chloride in the diet will allow the kidneys to release more bromine into the urine for excretion.” Bromide is a huge problem today and both Dr. Brownstein and I have written books on iodine, which again bring in the salt question. Iodine gets its way into almost any medical protocol today and combines perfectly with magnesium chloride and sodium bicarbonate. (I recently received a note from Dr. Brownstein: “Loved your iodine book. Great piece of work! Can’t wait for your next book.”)

We are at a very interesting level of biology and physiology when we talk about bicarbonate, magnesium, and chloride ions. And even sodium in the sodium part of bicarbonate is absolutely essential to human health. As we mentioned in another chapter, sodium bicarbonate as well as citrate and phosphate salts do not raise blood pressure to the same extent as do the corresponding amounts of sodium chloride. A study on mineral water containing sodium bicarbonate has confirmed the absence of any effect on blood 20

pressure in elderly individuals. <sup>1174</sup>

Sodium itself is needed for many functions of the body. Its main function is in providing the balancing of fluids in the body.

Sodium is necessary for life and a deficiency can result in often life-threatening conditions such as dehydration, heart palpitations, and muscle cramping, all of which can rapidly progress to more dangerous situations if left untreated. So sodium bicarbonate is a good way of getting the essential salt we need. Most of the salt that is consumed in the world is not any good anyway; it is salt with the minerals all stripped out, and that goes for sea salt as well as mined processed salt. Salt is a very important subject. It is most effective in stabilizing irregular heartbeats and, contrary to the misconception that it causes high blood pressure, it is actually essential for the regulation of blood pressure—in conjunction with water. For more information read Dr. David Brownstein's book SALT—Your Way to Health.

Sodium bicarbonate is known to decrease serum concentration of ionized magnesium ( $Mg^{2+}$ ) when sodium bicarbonate is added to

neonatal serum in vitro. The addition of sodium bicarbonate causes a significant decrease in  $Mg^{2+}$ . From this in vitro study we speculate that fast infusion of sodium bicarbonate in human neonates may potentially cause a clinically significant decrease 20

in serum  $Mg^{2+}$ . <sup>1175</sup>

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Magnesium stabilizes ATP <sup>1176</sup> , allowing 20

DNA and RNA transcriptions and repairs. <sup>1177</sup>

Where would the magnesium go but into the cells and bones where most magnesium reserves are found? Higher pH levels and the bicarbonate itself will help the magnesium leave the blood serum driving  $Mg^{2+}$  into the cells where again the bicarbonate will carry it from the cytoplasm into the mitochondria where, in cases of chronic disease, it is desperately needed. Thus magnesium and bicarbonate, when used together, would considerably increase the energy production in body cells.

$Mg^{2+}$  is critical for all of the energetics of the cells because it is absolutely required that  $Mg^{2+}$  be bound by ATP, the central high-energy compound of

the body.

Dr. Boyd Haley

Magnesium bicarbonate decreases the production of acid from carbon dioxide in body cells. Magnesium and bicarbonate would at the same time increase energy in several ways. First, magnesium bicarbonate protects the natural organic and inorganic phosphate buffers in the cytoplasm of cells. Second, magnesium bicarbonate neutralizes the acid produced as a result of metabolic processes and ATP hydrolysis. This allows more ATP to be hydrolyzed; that is, more energy can be utilized.

Magnesium bicarbonate buffers the mitochondria in body cells from excess acid concentrations, which improves mitochondrial function and allows more ATP to be produced. When more ATP can be hydrolyzed and more ATP can be produced, body cells have sufficient energy for optimum function.

ATP without  $Mg^{2+}$  bound cannot create the energy normally used by specific enzymes of the body to make protein, DNA and RNA. ATP without enough  $Mg^{2+}$

is non-functional and leads to cell death.

Dr. Boyd Haley

Drs. Seeger and Budwig in Germany have shown that cancer is mainly the result of a faulty energy metabolism in the powerhouses of the cells—the mitochondria. ATP and most of the

enzymes involved in the production of energy require magnesium. A healthy cell has high magnesium and low calcium levels. The problem that comes with low magnesium (Mg) levels is the calcium builds up inside the cells while energy production decreases as the mitochondria gradually calcify. Thus taking magnesium chloride and sodium bicarbonate together is ideal for cellular environments turned acidic and calcified.

Magnesium ions constitute the physiologically active magnesium in the body; they are not attached to other substances 20

and are free to join in biochemical body processes. <sup>1178</sup>

There is no way one can address in this chapter all the possibilities and the medical power one can achieve when combining magnesium chloride with sodium bicarbonate. Whether one has heart or neurological disease, diabetes, cancer or a bad case of the flu, taking these substances together offer doctors and patients safe and effective treatments.

So deep are the protective, buffering, and neutralizing properties of bicarbonate that it is used even with radiation exposure to protect the kidneys and other tissues. In a world that is already overexposed to uranium oxide and mercury, magnesium bicarbonate becomes even more important because mercury and uranium oxide directly attack the nuclear material and mitochondria of the cells.

The use of DU weaponry by the U.S., defying all international treaties, will slowly annihilate all species on earth including the human species, and yet this country continues to do so with full knowledge of its destructive potential.

Leuren Moret

“Depleted uranium (DU) is highly toxic to humans, both chemically as a heavy metal and radiologically as an alpha particle emitter, and is very dangerous when taken internally,” writes Dr. Rosalie 20

Bertell, Canadian Epidemiologist. <sup>1179</sup> A new study, conducted by biochemist Dr. Diane Stearns at Northern Arizona University confirms that, separate from any radiation risks, cells exposed 20

to uranium will bond with the metal chemically. <sup>1270</sup>

The kidneys are usually the first organs to show chemical damage upon uranium exposure; military manuals suggest doses or infusions of sodium bicarbonate to help alkalize the urine if this happens. This makes the



uranyl ion less kidney-toxic and promotes excretion of the nontoxic uranium-carbonate complex. The oral administration of sodium bicarbonate diminishes the severity of the changes produced by uranium in the kidneys.

121

Uranium and phosphate have a strong chemical affinity for each other and the DNA and mitochondria are loaded with phosphate, so uranium is a DNA and mitochondria deep-penetration bomb. The uranium is attacking on fundamental cellular levels while mercury offers a knockout punch by attacking the sulfur bonds, in addition to being highly toxic to nerve cells. Nephrotoxicity of the kidneys with necrosis of proximal tubules has been seen to increase significantly with dual exposure to both uranium and mercury.<sup>122</sup>

Bicarbonate ions neutralize carbonic acid formed in the body during metabolic processes. Several studies have shown that an increased intake of bicarbonate may help prevent muscle wasting and bone loss. Our diets are usually acid. Acids burn out our cells and cause accelerated aging. Bicarbonate is alkaline and provides the body with the extra alkalinity needed by the body to neutralize excess acidity.

Emergency Room Medicines For

Chronic & Acute Diseases

Magnesium bicarbonate clearly comes out on top in the class of cerebral protective agents. Magnesium bicarbonate offers significant cerebral protection with a high preservation effect on neurological function following brain injury or in healing chronic impaired dysfunction like in Parkinson's and Alzheimer's diseases.

When the nervous system is injured, the brain produces self-protective molecules in an attempt to halt damage. Following injury, the death of nerve cells occurs over a prolonged period of many hours or days, which provides a "window" for therapeutic intervention. Magnesium chloride is the undisputed best first therapeutic agent to be injected for stroke and is being tested in ambulances in Los Angeles.

This chapter is opening up a new door for allopathic medicine because it combines two emergency room and intensive care medicines for everyday use. My new book that lays out my conceptual designs for the future of medicine is called Principles and Practices of Natural Allopathic Medicine .

Magnesium chloride and sodium bicarbonate are non-pharmaceutical, non-toxic, concentrated, nutritional medicines. These are backbone medicines no clinic or home medical kit should be without.

## 11 . Why Mitochondrial Cocktails Are Important Introduction to Mitochondrial Medicine

After reading “The Ultimate Mitochondrial Cocktail” chapter, it is good to study why such a cocktail would be so important.

Mitochondrial medicine is a new and rapidly developing medical

subspecialty inside of allopathic medicine, but everyone needs to know it for, in reality, it is the practice of general medicine and should not be put behind the medical bars of metabolic medicine.

When medicine says, “About one in 4,000 children in the United States will develop mitochondrial disease by the age of 10,” they display an enormous ignorance of what is happening on a cellular level. Mitochondrial disruption, with which most people, including children, are suffering, is all too common in the age of toxicity and nutritional depletion. In adults who accumulate high levels of heavy metals and other chemical compounds, many diseases of aging have been found to have defects of mitochondrial function. These include but are not limited to type 2 diabetes, Parkinson’s disease, atherosclerotic heart disease, stroke, Alzheimer’s disease, and cancer.

There are no cures for mitochondrial diseases as far as allopathic medicine is concerned, so treatment, in their eyes, can only focus on reducing symptoms or delaying or preventing the progression of the disease. Typically, allopathic medicine will suggest the following for the treatment of the mitochondria.

Vitamins and supplements prescribed might include: Coenzyme Q10

B complex vitamins: thiamine (B1), riboflavin (B2), niacin (B3), B6, folate, B12, biotin, pantothenic acid Vitamin E, lipoic acid, selenium, and other antioxidants L-carnitine (Carnitor®)

Intercurrent illness supplement: vitamin C, biotin Though these supplements can be very helpful. they do not get down to the basics of mitochondrial physiology. In this chapter we introduce magnesium thiosulfate, which can be taken in the much less expensive form of sodium thiosulfate if magnesium is taken in sufficient quantities in its chloride form. Throughout my writings, mitochondria come into play and we have examined intimately how crucial magnesium is. In this chapter the crucial point is sulfur.

Sulfur is one of the basic elements of life. In fact, sulfur is the fourth most abundant mineral in the body. The proper acid-alkaline balance of the body cannot be maintained without it.

From Dr. Michael Eades, <sup>123</sup> “So, if free radicals cause this damage, why can’t we stop it with antioxidants? We do. But not

the antioxidants that we take in supplement form—those don’t make their way into the interior of the mitochondria where the damage takes place. Nature has endowed us with our own antioxidant system located within the mitochondria where, so to speak, the rubber meets the road in terms of free radical damage. The antioxidants produced require sulfur, which comes from the sulfur-containing amino acids, i.e. methionine.” And that is why magnesium thiosulfate and sodium thiosulfate (STS) are so effective. Sulfur is a main source of antioxidants in the mitochondria.

Sulfur has a vital relationship with protein since sulfur is found

in the amino acids methionine, cystine, and cysteine. Thus, these amino acids are known as the sulfur-bearing amino acids, which are considered the building blocks of protein.

So when we talk about mitochondrial cocktails we are going to want to add thiosulfate to our magnesium bicarbonate mixture. For those who make their own RO or distilled water, adding pinches of magnesium, bicarbonate, and thiosulfate will remineralize the water in an ideal way, turning the water into a useful medicine.

This cocktail will reach directly to the level of mitochondrial physiology where taking a whole bunch of standard antioxidant supplements will not.

Sodium thiosulfate (STS) is a calcium-chelating agent with antioxidant properties.

Dr. Carlos E. Araya

The beneficial effects of STS are thought to be due in part to its ability to enhance the solubility of calcium deposits. It has a small molecular weight of 248 ( $\text{Na}_2\text{S}_2\text{O}_3$ ), and in patients with normal renal function it has a serum half-life of 15 minutes. STS

facilitates the mobilization of calcium from vessels affected by calcium deposits.

Ninety-two percent of autistic children seem to be wasting sulfate in the urine, for blood plasma levels are typically low and urinary levels are high. There is also an abnormal cysteine-to-sulfate ratio.

Dr. Rosemary Waring

Sulfate is the most oxidized form of sulfur. It doesn't need to be oxidized anymore, so supplementing or bathing in sulfate supplies what is lacking because of the body's inability to

oxidize the sulfur in foods. This is especially important for autistic children. Most children on the autism spectrum are very low in sulfate; they may be as low as 15 percent of the amount in neurologically typical people. People with low or no ability to convert compounds to sulfate have problems handling environmental chemicals, some medications, and even some

chemicals produced within the body. They include people with other conditions such as Alzheimer's disease, Parkinson's, rheumatoid arthritis, and chemical sensitivities.

Sulfates have a negative charge and repel each other, so that charge forms a barrier on the outside of the cell called the matrix, or the glycocalyx. Sulfate is often found in the glycoprotein film also. Glycoprotein is a sugar/protein film that enables cell-to-cell communication. This film is on all cells of the body, so if systemic sulfate is low, you most likely have a big problem that is quite general to the whole body.

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Specifically, the more densely-sulfated the GAGs, <sup>1274</sup> the more they can resist all kinds of infection. These sulfate molecules govern or influence the ability of the cell to produce its unique set of specialized proteins. It is not something you want to be operating from a deficit, yet that is the condition of most autistic children.

Sodium thiosulfate may be effective in  
reducing some chemically induced cancers.

U.S. EPA

Another excellent source of sulfur is methyl sulfonyl methane (MSM). The research on MSM as an excellent low-toxicity medicinal is solid, suggesting strongly that supplementing sulfur is extraordinarily useful for people who suffer from chronic disease. Dr. Stanley Jacobs, Professor of Surgery at Oregon Health Sciences University, has conducted clinical studies on MSM, has used it with his patients for over 20 years, and has documented his findings in the book entitled *The Miracle of MSM*

. Dr. Jacobs lists MSM's most significant actions as: an analgesic (pain controller), an anti-inflammatory, dilates blood vessels and increases blood flow, blocks the action of cholinesterase, helps to restore normal bowel activity, reduces muscle spasms, alters the cross-linking process in collagen, has anti-parasitic properties (particularly for giardia), and has immune-

normalizing effects as observed in some autoimmune diseases such as rheumatoid arthritis, lupus, and scleroderma.

### Mercury Attacks Sulfur Bonds

Thiol poisons, especially mercury and its compounds, reacting with SH groups of proteins, lead to the lowered activity of various enzymes containing sulfhydryl groups. This produces a series of disruptions in the functional activity of many organs and tissues of the organism.

Professor I. M. Trakhtenberg, Russia

One of sulfur's most important health roles is in carbohydrate metabolism, which is significant for hypoglycemics and diabetics.

Enzymes are proteins, and like all proteins they consist of chains of amino acids. These chains have to be faulted in a specific way to give the enzyme its activity. In many enzymes, the structure of the enzyme is ensured by cross-bonding of the amino acid chains. These cross-bonds consist of double sulfur bonds.

Mercury, in its various forms, has a great attraction to the sulfhydryls or thiols. A thiol is any organic compound containing a univalent radical called a sulfhydryl and identified by the symbol -SH (sulfur-hydrogen).

Sulfur-bridges are covalent S-S bonds between two cysteine amino acids, which tend to be quite strong. These sulfur bonds are damaged when poisonous substances that are not naturally present have been added to the local environment. Mercury binds to the -

SH (sulfhydryl) groups, resulting in inactivation of sulfur and blocking of enzyme functions while producing sulfur metabolites with high toxicity that the body has difficulty dealing with.

Sulfur is essential in enzymes, hormones, nerve tissue, and red blood cells. These sulfur bonds are crucial to human biology.

Metals such as iron, mercury, arsenic, lead, and possibly aluminum may play a role in the actual destruction of beta cells through stimulating an auto-immune reaction to them after they have bonded to these cells in the pancreas. What we will focus on here though is the fact that insulin has three sulfur-containing cross-linkages and the insulin receptor has a tyrosine kinase-containing sulfur bond; these are the preferred targets for binding by both mercury and lead.

Should mercury attach to one of these three sulfur bonds, it will interfere with the normal biological function of the insulin molecule. In reality there is no “should” about it—the average adult inhales many trillions of mercury atoms a day from a mouth full of amalgam, fish provide trillions more, the air more, and in children, vaccines provide one-day surges of trillions of mercury molecules in the form of ethyl-mercury, which is vastly more toxic than metallic mercury. Insulin molecules are directly assaulted, as are insulin receptor sites.

Each insulin molecule consists of precisely two peptide chains (A and B) bound together by sulfa bonds at the A7-B7 cysteine site and at the A20-B19 cysteine site, and there is an additional cysteine sulfa bond at the A6-A11. All insulin molecules consist of this two chain structure, with an A chain of 21 amino acids and a B chain of 30 amino acids, for a total of 51 amino acid molecules bound by 3 sulfa bonds.

### Testimonial

My use of magnesium thiosulfate began after reading your newsletter about sodium thiosulfate. I had a patient who could not tolerate sodium due to abnormal water retention. I got in touch with a scientist from Moscow State University, Professor of Biology Vladimir Voeikov. He suggested using magnesium thiosulfate. It had been used as a vasodilator and also as a strong detoxifier.

I myself have been using it as a one tsp per glass of water three times per week at bedtime for one month. I feel so good and clean in the morning after. It is absolutely nontoxic, will help you to clean the body and at the same time will replenish magnesium, which is very important.

Magnesium thiosulfate is a great alternative to sodium thiosulfate but much more expensive.

I have had contact with a Dr. Revici who hypothesized that alcohol, drug, and nicotine addictions are anabolic in nature, hence treatable by catabolic agents. He has administered lipid-based selenium and sulfur compounds to 3,000 heroin addicts, physically detoxifying the vast majority without withdrawal symptoms. He has also prevented and counteracted arteriosclerosis with several catabolic agents. The most active agent seems to be magnesium thiosulfate.

Dr. Oleg Yasko, ND

## 1. Introduction to Magnesium & Cancer



Researchers from Japan's National Cancer Center in Tokyo have found that an increased intake of magnesium reduces a man's risk of colon cancer by over 50 percent. Men with the highest average intakes of magnesium (at least 327 mg/d) were associated with a 52 percent lower risk of colon cancer, compared to men who consumed the lowest average intakes. Published in the Journal of 20



Nutrition , <sup>1275</sup> the research studied 87,117 people with an average age of 57 and followed them for about eight years.

Dietary intakes were assessed using a food frequency questionnaire. Average intakes of magnesium for men and women were 284 and 279 milligrams per day.

A meta-analysis of prospective cohort studies by researchers at Stockholm's Karolinska Institutet reported that for every 100-milligram increase in magnesium intake, the risk of developing 20

type 2 diabetes decreased by 15 percent. <sup>1276</sup> Even after this kind of information comes out we find Dr. Susanna Larsson and Dr.

Alicia Wolk concluding that while it is too early to recommend magnesium supplements for type 2 diabetes prevention, increased consumption of magnesium-rich food "seems prudent." With foods losing much of their nutritional value, it's next to impossible to intake enough dietary magnesium to reach the medicinal levels that are required to address magnesium cell deficiencies. Thus, this is neither an intelligent nor a prudent magnesium supplementation program.

Who is running around screaming from the hilltops that those wishing to avoid the agony of cancer and its orthodox treatment at the hands of allopathic oncologists should be taking high amounts of magnesium? Who in contemporary medical circles has a clear enough head to see magnesium as a physicist would see gravity or any other basic principle of life? Most people inside the medical system just don't know what they don't know and they don't seem interested in finding out. This is a modern disease and I am sorry to say that even some people deep within the folds

of the magnesium world have not understood what is really necessary to treat patients with magnesium effectively.

There is no room for doubts, second thoughts, excuses, or anything else. Ignorance of magnesium and how it is best supplemented is inexcusable; we have to know about all the methods of administration including

intravenous, oral, transdermal, and nebulized magnesium and how to best leverage a combination of these for each patient's individual needs.

The pharmaceutical paradigm (agenda) just does not want its practitioners to see what is really the underlying cause of many of the dramatic diseases humanity is facing today; it does not want them to see, even though the evidence and studies are everywhere, that magnesium deficiency is a primary cause of the vast majority of chronic diseases and cancer. Everyone benefits from higher magnesium intake. Everyone, even medical officials, might be able to think and feel better if they were not running their magnesium tanks on empty.

In the U.S., combined annual costs for treating diabetes along with additional factors such as lost productivity amount to \$174

billion, according to the American Heart Association. Heart experts worry that without better ways to prevent and treat diabetes, the disease threatens to reverse nearly a half-century of advances against cardiovascular disease, which remains the world's leading killer. But these same experts are blinded by their own arrogance because medical science has already delivered a fundamental answer, which will not change with time. Opinion or ignorance of scientific facts will continue to rule.

We can add many more hundreds of billions of dollars to cover the costs of cancer in the same terms and hundreds of billions more for a variety of other diseases. If the medical establishment could just see the forest from the trees (which it cannot) and would seriously recommend that all patients significantly increase their intake of magnesium along with other minerals like iodine, selenium, and bicarbonate, we would have a huge shift in health. The public would benefit vastly more from this than from any new national health plan that just gives us more medicines that do more harm than good.

Contemporary medicine is in a state of crisis. In fact it's going terminal and will go down hard when the economy does. Orthodox medicine is dead on arrival because free inquiry, natural curiosity, and open-minded discussion died so long ago that no one can remember anything else.

The “new inquisition” (conducted on a regular basis by the FDA) consists not of cardinals and popes, but of the editors and reviewers of medical journals, of leading medical authorities, and behind them pharmaceutical corporations and governments that have a vested interest in keeping the status quo. These people are ignorant—massively so—of the medical science on magnesium.

They might as well be astronauts with no idea of the laws of gravity.

In truth, medical science theory should always surrender to the primacy of evidence and there is no shortage of evidence and research on magnesium. When it comes to new ideas, evidence is ignored and then ridiculed, and if that fails, authors or practitioners are attacked. But when it comes to magnesium there is nothing medical officials can do. They might as well face a tidal wave standing on the beach, so conclusive and extensive is the research.

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Magnesium stabilizes ATP, <sup>1277</sup> allowing

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DNA and RNA transcriptions and repairs. <sup>1278</sup>

There is a power and a force in magnesium that cannot be equaled anywhere else in the world of medicine. There is no substitute for magnesium in human physiology; nothing comes even close to it in terms of its effect on overall cell physiology. Without sufficient magnesium, the body accumulates toxins and acid residues, degenerates rapidly, and ages prematurely. It goes against a gale wind of medical science to ignore magnesium chloride used transdermally in the treatment of any chronic or acute disorder, especially cancer .

Magnesium repletion produced rapid

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disappearance of the periosteal tumors. <sup>1279</sup>

Aleksandrowicz et al. in Poland conclude that inadequacy of magnesium and antioxidants are important risk factors in 20

predisposing to leukemias. <sup>1370</sup> Other researchers found that 46

percent of the patients admitted to an ICU in a tertiary cancer center presented hypomagnesemia. They concluded that the incidence of hypomagnesemia in critically ill cancer patients is high. <sup>131</sup> In animal studies we find that magnesium deficiency has caused lymphopoietic neoplasms in young rats. A study of rats surviving magnesium deficiency sufficient to cause death in convulsions during early infancy in some, and cardiorenal lesions weeks later in others, disclosed that some of the survivors had thymic nodules or lymphosarcoma. <sup>132</sup>

One would not normally think that magnesium deficiency can increase the risk of cancer, while simply maintaining ideal levels can protect against cancer. When we consider that over 300

enzymes and ion transport require magnesium, and that its role in fatty acid and phospholipids acid metabolism affects permeability and stability of membranes, we can see that magnesium deficiency would lead to physiological decline in cells, setting the stage for cancer. Anything that weakens cell physiology will lead to the infections that surround and penetrate tumor tissues.

These infections are proving to be an integral part of cancer.

Magnesium deficiency poses a direct threat to the health of our cells. Without sufficient amounts, our cells calcify and rot.

They become breeding grounds for yeast and fungi colonies, invaders all too ready to strangle our life force and kill us.

Over 300 different enzymes systems rely upon magnesium to facilitate their catalytic action, including ATP

metabolism, creatine-kinase activation, adenylate-cyclase, and sodium-potassium-ATPase. <sup>133</sup>

It is known that carcinogenesis induces magnesium distribution disturbances, causing magnesium mobilization through blood cells and magnesium depletion in non-neoplastic tissues. Magnesium deficiency seems to be carcinogenic, and in the case of solid tumors, a high level of supplemented magnesium inhibits 20

carcinogenesis. <sup>1374</sup> Both carcinogenesis and magnesium deficiency increase the plasma membrane permeability and fluidity.

Scientists have in fact found out that there is much less  $Mg^{++}$

binding to membrane phospholipids of cancer cells than to normal 20 cell membranes. <sup>1375</sup>

Magnesium protects cells from aluminum, mercury, lead, cadmium, beryllium, and nickel.

Magnesium is, in general, essential for the survival of our cells but takes on further importance in the age of toxicity where our bodies are being bombarded on a daily basis with heavy metals.

According to Dr. Russell Blaylock, low magnesium is associated with dramatic increases in free radical generation as well as glutathione depletion; this is vital since glutathione is one of 20

the few antioxidant molecules known to neutralize mercury. <sup>1376</sup>

Without the cleaning and chelating work of glutathione, cells begin to decay; cellular filth and heavy metals accumulate—

excellent environments to attract deadly infection/cancer.

There is drastic change in ionic flux from the outer and inner cell membranes (higher Ca and Na, lower Mg and K levels) in both the

impaired membranes of cancer cells and those of Mg deficiency.

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Anghileri et al. <sup>1377</sup>, <sup>1378</sup> proposed that modifications of cell membranes are principal triggering factors in cell transformation leading to cancer. Using cells from induced cancers, they found that there is much less magnesium binding to membrane phospholipids of cancer cells compared to normal cell membranes.

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<sup>1379</sup> It has been suggested that magnesium deficiency may trigger 20 20

carcinogenesis by increasing membrane permeability. <sup>174</sup> 70 The membranes of magnesium-deficient cells seem to have a smoother surface and decreased membrane viscosity than normal cells,

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analogous to changes in human leukemia cells. <sup>1741</sup>, <sup>1742</sup> And we find that lead (Pb) salts are more leukemogenic when given to magnesium-deficient rats than when they are given to magnesium-20

adequate rats, suggesting that magnesium is protective. <sup>1743</sup>

Magnesium has an effect on a variety of cell membranes through a process involving calcium channels and ion transport mechanisms. Magnesium is responsible for the maintenance of the trans-membrane gradients of sodium and potassium.

Long ago researchers postulated that magnesium supplementation of those who are magnesium-deficient, like chronic alcoholics, might 20 20

decrease emergence of malignancies,<sup>174 74</sup> and now modern researchers have found that all types of alcohol—wine, beer or liquor—add equally to the risk of developing breast cancer in women. The researchers, led by Dr. Arthur Klatsky of the Kaiser Permanente Medical Care Program in Oakland, Calif., revealed their findings at a meeting of the European Cancer Organization in Barcelona in late 2007. It was found that women who had one or two drinks a day increased their risk of developing breast cancer by 10 percent. Women who had more than three drinks a day raised their risk by 30 percent. The more one drinks, the more one drives down magnesium levels.

Breast cancer is the second most common cancer killer of women, after lung cancer. It will be diagnosed in 1.2 million people globally this year and will kill 500,000.

According to data published in the British Journal of Cancer in 2002, four percent of all breast cancers in the United Kingdom—

about 44,000 cases a year—are due to alcohol consumption. An important question though, and one not asked by medical or health officials, is: What is causing the cancer? Is it the alcohol itself or the resultant drop in magnesium levels that is cancer provoking? Though some studies have shown that light-to-moderate alcohol use can protect against heart attacks, it does us no good to drink if it causes cancer. Perhaps if magnesium had been supplemented in women drinkers who were studied there would have been no increase of cancer from drinking.

Alcohol has always been known to deplete magnesium, and is one of the first supplements given to alcoholics when they stop and attempt to detoxify and withdraw.

Researchers from the School of Public Health at the University of Minnesota have just concluded that diets rich in magnesium<sup>20 20</sup>

reduced the occurrence of colon cancer.<sup>174 75</sup> A previous study<sup>20 20</sup>

from Sweden<sup>174 76</sup> reported that women with the highest magnesium

intake had a 40 percent lower risk of developing the cancer than those with the lowest intake of the mineral.

High levels of both magnesium and calcium have been linked to reduced risks of colon cancer, but studies have also shown that high calcium levels inhibit the absorption of magnesium.

According to Qi Dai, MD, PhD and co-workers, Americans have high calcium intake, but also a high incidence of colorectal cancer.

“If calcium levels were involved alone, you’d expect the opposite direction. There may be something about these two factors combined—the ratio of one to the other—that might be at play,”

said Dai. “The risk of colorectal cancer adenoma recurrence was reduced by 32 percent among those with baseline calcium to magnesium ratio below the median in comparison to no reduction 20 20

for those above the median,” said Dai. <sup>174</sup> 77

Pre-treatment hypomagnesemia has been

reported in young leukemic children, 78 percent of whom have histories of anorexia and have excessive 20 20

gut and urinary losses of magnesium. <sup>174</sup> 78

Several studies have shown an increased cancer rate in regions with low magnesium levels in soil and drinking water, and the same for selenium. In Egypt the cancer rate was only about 10

percent of that in Europe and America. In the rural fellah it was practically non-existent. The main difference was an extremely high magnesium intake of 2.5-3g in these cancer-free populations, 20 20

ten times more than in most western countries. <sup>174</sup> 79

The School of Public Health at the Kaohsiung Medical College in Taiwan found that magnesium also exerts a protective effect against gastric cancer,



but only for the group with the highest levels. <sup>175</sup> 70

If we looked it would probably be very difficult to find a cancer patient with anywhere near normal levels of cellular magnesium, meaning cancer probably does not exist in a physical cellular environment full of magnesium. It makes perfect medical sense to saturate the body with magnesium through transdermal means.

Magnesium deficiency has been implicated in a host of clinical disorders but the medical establishment just cannot seem to grasp that it is an important medicine.

It is as if the collective medical profession has just pulled the plug on medical intelligence. In fact it has done exactly this and it seems too late for it to redefine itself, which is a tragedy. Though magnesium improves the internal production of defensive substances, such as antibodies, and considerably improves the operational activity of white granulozytic blood

cells (shown by Delbert with magnesium chloride), and contributes to many other functions that ensure the integrity of cellular metabolism, no one thinks to use it in cancer as a primary treatment. What is even worse than this—the medical establishment does not even use magnesium as a secondary treatment or even use it at all, yet gladly uses radiation and chemotherapy, both of which force magnesium levels down further.

To not replete cellular magnesium levels is negligent especially in the case of cancer where a person's life is on the line. An oncologist who ignores his patient's magnesium levels would be analogous to an emergency room physician not rushing resuscitation when a person stops breathing. If one elects to have or has already had chemotherapy, they have four times the reason to pay attention to a concentrated protocol aimed at replenishing full magnesium cellular stores.

Magnesium chloride is the first and most important item in any person's cancer treatment strategy. Put in the clearest terms possible, our suggestion from the first day on the Survival Medicine Cancer Protocol is to almost

drown oneself in transdermally-applied magnesium chloride. It should be the first—

not the last—thing we think of when it comes to cancer. It takes about three to four months to drive up cellular magnesium levels to where they should be when treated intensely transdermally, but within days patients will commonly experience its lifesaving medical/healing effects. For many people whose bodies are starving for magnesium, the experience is not too much different than for a person coming out of a desert desperate for water. It is that basic to life, that important, that necessary.

That same power found in magnesium that will save your life in the emergency room during cardiac arrest or that will diminish damage of a stroke if administered in a timely fashion is the same power that can save your life if you have cancer. All you have to do is pour it into your bath or spray it right onto your body. What could be simpler?

### Special Note on Calcium & Cancer

Experts say excessive calcium intake may be unwise in light of recent studies showing that high amounts of the mineral may increase risk of prostate cancer. “There is reasonable evidence to suggest that calcium may play an important role in the development of prostate cancer,” says Dr. Carmen Rodriguez, senior epidemiologist in the epidemiology and surveillance research department of the American Cancer Society (ACS).

Rodriguez says that a 1998 Harvard School of Public Health study of 47,781 men found those consuming between 1,500 and 1,999 mg of calcium per day had about double the risk of being diagnosed with metastatic prostate cancer (cancer that has spread to other parts of the body) as those getting 500 mg per day or less. And those taking in 2,000 mg or more had over four times the risk of

developing metastatic prostate cancer as those taking in less than 500 mg.

Calcium and magnesium are opposites in their effects on our body structure. As a general rule, the more rigid and inflexible our body structure is, the less calcium and the more magnesium we need.

Later in 1998, Harvard researchers published a study of dairy product intake among 526 men diagnosed with prostate cancer and 536 similar men not diagnosed with the disease. That study found a 50 percent increase in prostate cancer risk and a near doubling of risk of metastatic prostate cancer among men consuming high amounts of dairy products, likely due, say the researchers, to the high total amount of calcium in such a diet. The most recent Harvard study on the topic, published in October 2001, looked at dairy product intake among 20,885 men and found men consuming the most dairy products had about 32 percent higher risk of developing prostate cancer than those consuming the least.

The adverse effects of excessive calcium intake may include high blood calcium levels, kidney stone formation, and kidney

complications.<sup>1751</sup> Elevated calcium levels are also associated with arthritic/joint and vascular degeneration, calcification of soft tissue, hypertension and stroke, and increase in VLDL

triglycerides, gastrointestinal disturbances, mood and depressive disorders, chronic fatigue, and general mineral imbalances including magnesium, zinc, iron, and phosphorus. High calcium levels interfere with vitamin D and subsequently inhibit the vitamin's cancer protective effect unless extra amounts of

vitamin D are supplemented.<sup>1752</sup>

Magnesium is the mineral of rejuvenation and prevents the calcification of our organs and tissues that is characteristic of the old-age-related degeneration of our body.

Recommendations of magnesium to calcium ratios typically range from 1:2 to 1:1. For those interested in preventing cancer one should look closely at a 1:1 ratio, and during the first six months of cancer treatment, a ratio of 10:1 ( ten parts magnesium to one part calcium ) is very helpful. The only real danger of extremely high magnesium levels comes with patients suffering from kidney failure.

Up to 30 percent of the energy of cells is used to pump calcium out of the cells.

Doctors who have used intravenous magnesium treatments know the benefits of peaking magnesium levels, even if only temporarily.

For the cancer patient the transdermal approach combined with oral use offers the opportunity to take magnesium levels up strongly and quickly. For emergency situations three applications a day is called for; for urgent, two treatments would be indicated though one strong treatment with an ounce of a natural magnesium chloride solution spread all over the body like a sunscreen is a powerful systemic treatment.

Medical wisdom tells us that magnesium is actually the key to the body's proper assimilation and use of calcium as well as other important nutrients. If we consume too much calcium without sufficient magnesium, the excess calcium is not utilized correctly and may actually become toxic, causing painful conditions in the body. Hypocalcemia is a prominent manifestation of magnesium deficiency in humans (Rude et al., 1976). Even a mild degree of magnesium depletion significantly decreases the serum calcium concentration (Fatemi et al., 1991).

Calcium requirement for men and

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women is lower than previously estimated. <sup>1753</sup>

13 . Magnesium, Selenium & Zinc

in Cancer Prevention

Since ending one's life with cancer is not pleasant, it behooves all of us to be concerned with its prevention.

Minerals are essential for life and health and provide the keys for the prevention of cancer. Minerals (in the form of cesium 20 20

chloride) <sup>175</sup> 74 also provide a reasonably safe way to treat advanced stage-four cancer without resorting to the burn and poison tactics of radiation and chemotherapy.

It is time to get serious about cancer prevention, with the disease predicted to surge in the next 15 years. The Association for International Cancer Research (AICR) said that if current trends continue, the number of people developing cancer is set to rise at an “alarming” rate. The World Health Organization predicts that cases of cancer will increase by up to 50 percent worldwide by 2020.

Cancer is the second leading cause of death, exceeded only by heart disease. Among children ages one to 14, cancer is now the leading cause of death by disease. At current rates, invasive cancer will be diagnosed in half of all men and in one in three women in their lifetime. More than 1.3 million new cases of invasive cancer were estimated to be diagnosed in 2006 meaning that approximately 1,500 Americans will die of the disease every day. “Whether it is cancer or autism that is affecting our families and showing up in our examination rooms, the growing rates of chronic disease compel us to search for clues and

answers to determine the true causes of these increasingly prevalent illnesses,” says Physicians for Social Responsibility.

“With rates of cancer incidence rising, mortality rates not falling, and an ever increasing armamentarium of high-tech scanners, radiotherapy equipment, and chemotherapeutic drugs being directed in what sometimes appears to be a losing battle, there is neither a more emotive nor scientifically charged issue than cancer,” writes Dr. Sandra Goodman. Along with the rest of the allopathic medical establishment the last thing oncologists want to admit is that the population is suffering from poisoning from hundreds of carcinogenic compounds and that this is largely what is driving the escalating epidemic in cancer.

In March 2004, the federal government issued an unusually detailed alert to the nation’s 5.5 million healthcare workers: The powerful drugs used in chemotherapy can themselves cause cancer and pose a risk to nurses, pharmacists and others who handle them. Four years in the making, the

alert was issued by the National Institute for Occupational Safety and Health (NIOSH). Chemotherapy—the use of potent drugs to kill cancerous cells—is more than 60 years old. The first such drugs were nitrogen mustards, originally developed as chemical warfare agents. Modern chemotherapy drugs are so strong that they can cause secondary cancers in patients; to a healthy person, they're poison. Most healthcare workers are clueless about how toxic these agents really are. Oncologists use treatments that cause cancer to treat cancer when they use radiation and chemotherapy.

The prevailing medical paradigm surrounding cancer today is in total disavowal of nutrition as crucial in cancer prevention and treatment, and this clearly puts the cancer industry and health officials in clear opposition to many distinguished research scientists. Though the data speaks for itself in thousands of studies, the majority of cancer specialists are patronizing to patients who wish to use nutritional methods in their cancer treatment protocol. Oncologists' vociferous and over-zealous protestations of the inherent worthlessness and supposed quackery of nutrition in cancer treatment is embarrassing to the institution of medicine. It exposes many of these doctors as little more than human leaches, extracting money and profits on 20 20

the backs of cancer patients. <sup>175</sup> 75

Most mainstream physicians are unaware of the extensive depth of evidence about nutrients preventing and alleviating many deadly diseases . This is a disgrace since we can save countless lives and reduce needless suffering if we apply the power of minerals and vitamins in the prevention and treatment of cancer.

According to the National Foundation for Cancer Research, the value of minerals as part of an anticancer diet is frequently overlooked. However, minerals can play a vital role in fighting cancer. A prime example is the mineral selenium, which has powerful antioxidant properties. Selenium (Se) is an essential

micronutrient with important biological and biochemical functions in organisms because of its unique antioxidant properties and its ability to regulate thyroid gland metabolism. It is well known that selenium is an

antagonist that moderates the toxic effects of many heavy metals such as arsenic, cadmium, mercury, and lead in organisms.

Data suggests that a diet rich in selenium protects against cancer of the stomach, breast, esophagus, lung, prostate, colon, and rectum. According to Dr. Harold Foster, death rates in the U.S. for cancer are lower when blood selenium levels are high.

One important study found that high blood levels of selenium are associated with a four- to five-fold decrease in the risk of prostate cancer. Scientists at Stanford University studied 52 men who had prostate cancer and compared them to 96 men who didn't.

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<sup>175</sup> 76 One surprising finding was that blood levels of selenium generally decreased with age. It is well known that the risk of prostate cancer increases dramatically as one ages.

Those who have studied geographical differences have seen that in low-selenium regions, higher death rates occurred from malignant lymphomas and cancers of the tongue, esophagus, stomach, colon, rectum, liver, pancreas, larynx, lung, kidneys, and bladder. In addition, cancer patients with low selenium levels tend to have a wider spread of the disease, more recurrences, and they die 20 20

sooner. <sup>175</sup> 77

In China, where the selenium levels in the soils varies much more dramatically than in the United States and the population is less mobile, an ecological study in 1985 showed dramatic results in linking cancer with selenium deficiencies. Dr. Shu-Yu Yu measured the selenium content of blood stored in blood banks in 30

different regions in China and classified the regions as high selenium, medium selenium, and low selenium. They then compared death rates from cancer to the selenium rates and found there was an exact correlation. In the

low selenium classification, three times as many people died from cancer as in the high selenium classification.

The West African country of Senegal is dominated by high concentrations of selenium in the soil and thus in their foods, and as expected, Senegalese males had the world's lowest rates for cancer of the trachea, bronchus and lung, stomach and colon, the fourth lowest for prostate cancer, and sixth lowest for esophageal cancer. Senegalese women had the lowest incidence of cancers of the trachea, bronchus, lung, esophagus, stomach, and colon, and second lowest for breast cancer, and fifth lowest for cancer of the uterus.

There is no doubt that selenium is essential for human health and that these elements may protect against cancer and other diseases. For this reason people in regions that are naturally rich in selenium tend to live longer. Selenium, especially when used in conjunction with vitamin C, vitamin E, and beta-carotene,

works to block chemical reactions that create free radicals in the body (which can damage DNA and cause degenerative change in cells, leading to cancer). Selenium also binds strongly with mercury protecting us from its damaging effects.



Selenium helps stop damaged DNA molecules from reproducing, meaning it acts to prevent tumors from developing. “It contributes towards the death of cancerous and pre-cancer cells.

Their death appears to occur before they replicate, thus helping stop cancer before it gets started,” says Dr. James Howenstine in *A Physician’s Guide to Natural Health Products That Work* .

A 1996 study by Dr. Larry Clark of the University of Arizona showed just how effective selenium can be in protecting against cancer. In the study of 1,300 older people, the occurrence of cancer among those who took 200 micrograms of selenium daily for about seven years was reduced by 42 percent compared to those given a placebo. Cancer deaths for those taking the selenium were cut almost in half, according to the study that was published in the *Journal of the American Medical Association* on December 25, 1996. In addition, the people who had taken selenium had 63

percent fewer prostate cancers, 58 percent fewer colorectal cancers, 46 percent fewer lung cancers and overall 37 percent fewer cancers. Selenium was found to reduce the risk of lung 20 20

cancer to a greater degree than stopping smoking. <sup>175</sup> 78

## Magnesium

It is generally accepted that a higher magnesium intake in the drinking water is associated with reduced cancer incidence and reduced frequency of cardiac infarction.

Information is scarce about the relationship between cancer and magnesium but researchers from the School of Public Health at the University of Minnesota concluded that diets rich in magnesium 20 20

reduced the occurrence of colon cancer. <sup>175</sup> 79 A previous study 20 20

from Sweden <sup>176</sup> 70 reported that women with the highest magnesium intake had a 40 percent lower risk of developing the cancer than those with

the lowest intake of the mineral.

Preliminary data also suggests a relationship between low intake of magnesium and kidney cancer.

A Dr. Hans A. Nieper, back in 1961, introduced cardiac therapy based on magnesium aspartate. He was surprised to observe that hardly any new cancer occurrences appear in the group of patients so treated. The rate of new cancerous diseases with long-term magnesium therapy was reported to be less than 20 percent of the frequency otherwise expected. In an uncontrolled trial, researchers in the UK found that intravenous magnesium relieves 20

neuropathy pain in patients with cancer. <sup>1761</sup>

## Zinc

Epidemiologic studies suggest that zinc deficiency may be 20

associated with increased risk of cancer. <sup>1762</sup> Zinc supplementation is associated with decreased oxidative stress and improved immune function, which may be among the possible mechanisms for its cancer preventive activity. Zinc is essential for health. It's needed for the enzymes that regulate cell division, growth, wound healing, and proper functioning of the immune system.

Zinc is an essential co-factor in a variety of cellular processes including DNA synthesis, behavioral responses, reproduction, bone formation, growth, and wound healing. Zinc is a component of insulin and it plays a major role in the efficiency of most of the functions of the body. Zinc is necessary for the free-radical-quenching activity of superoxide dismutase (SOD), a powerful antioxidant enzyme that breaks down the free-radical superoxide to form hydrogen peroxide. Zinc is required for the proper function of T-lymphocytes. The mineral also plays a role in acuity of taste and smell. And zinc is required for proper functioning of genetics, immunity, formation of red blood cells, organ, muscle and bone function, cell membrane stability, cell growth, division, and differentiation. Importantly, zinc is vital for the metabolism of vitamin A.

A paper by Dr. Mei and colleagues at the Anhui Medical University, Hefei, China suggests that some aspects of immune function can be enhanced by treatment with zinc. The authors state that it would be “reasonable to expect that zinc is instrumental in restoring failing immunocompetence of cancer patients.” Mei studied the influence of zinc and selenium-zinc upon the immune function (T-cells, granulocytes, and NK cells) of cancer patients. The results showed that immune response was 20

strengthened. <sup>176</sup><sup>3</sup>

Leukemic cells contain much less zinc than normal lymphocytes, suggesting an error in zinc metabolism, which appears correctable with zinc treatment. Zinc also is known to have some beneficial interactions with chemotherapy drugs. In one recent case, upon noting low blood levels of zinc in a three-year-old 11.3-kg girl, zinc at the rate of 3.18 mg/kg body weight/day was administered from the start of chemotherapy through the full three years of maintenance therapy. Dosage was split with 18 mg given at breakfast and 18 mg zinc with supper. The result was a bone marrow remission from 95+ percent blast cell count to an observed zero blast cell count in both hips within the first 14 days of 20 20

treatment, which never relapsed. <sup>176</sup> 74

#### 14 . Magnesium, Detoxification & Chelation Magnesium & Glutathione

Without sufficient magnesium, the body

accumulates toxins and acid residues, degenerates rapidly, and ages prematurely.

The involvement of free radicals in tissue injury induced by 20 20

magnesium deficiency <sup>176</sup> 75 causes an accumulation of oxidative products in heart, liver, kidney, skeletal muscle tissues, and 20 20

red blood cells. <sup>176</sup> 76

A magnesium deficiency can cause the body to lose potassium, something our bodies cannot afford. Within the cell wall is a sodium pump to provide high internal potassium and low internal sodium. Magnesium and potassium inside the cell assist oxidation, and sodium and calcium outside the cell wall help transmit the energy produced. The healthy cell wall favors intake of nutrients and elimination of waste products.

Magnesium protects cells from aluminum, mercury, lead, cadmium, beryllium, and nickel, which explains why re-mineralization is so essential for heavy metal detoxification and chelation. Magnesium protects the cell against oxyradical damage and assists in the absorption and metabolism of B vitamins and vitamins C and E, which are antioxidants important in cell protection. Recent evidence suggests that vitamin E enhances glutathione levels and may play a protective role in magnesium-deficiency-induced 20

cardiac lesions.<sup>176 77</sup> Magnesium in general is essential for the survival of our cells but takes on further importance in the age of toxicity where our bodies are being bombarded on a daily basis with heavy metals. Magnesium thus protects the brain from toxic effects of chemicals. It is highly likely that low total body magnesium contributes to heavy metal toxicity in children and is a strong participant in the etiology of learning disorders.

Without sufficient magnesium, the body accumulates toxins and acid residues, degenerates rapidly, and ages prematurely. Recent research has pointed to low glutathione levels being responsible for children's vulnerability to mercury poisoning from vaccines.

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<sup>176 78</sup> It seems more than reasonable to assume that low levels of magnesium would also render a child vulnerable.

According to Dr. Russell Blaylock, low magnesium is associated with dramatic increases in free radical generation as well as glutathione depletion and this is vital since glutathione is one of the few antioxidant molecules known to neutralize mercury.

<sup>176</sup> <sup>79</sup> Thus, sadly, children receiving thimerosal-containing vaccines are sitting ducks to mercury when both magnesium and glutathione levels are low. Also as a result of magnesium deficiency, too much nitric oxide (NO) is produced, which in turn may react with superoxide to form a very damaging compound peroxynitrite. Low magnesium levels can induce such excessive NO

production that even the glutathione in the red blood cells is damaged. These could provide some possible explanations for why 20 20

magnesium seems to protect the arteries. <sup>177</sup> <sup>70</sup>

“For every molecule of pesticide that your body detoxifies, you throw away or use up forever a molecule of glutathione, magnesium, and more,” says Dr. Sherry Rogers who goes on to say that, “Your body uses nutrients to make this glutathione and it uses energy as well. Every time we detoxify a chemical, we use up, lose, or throw away forever a certain amount of nutrients.”

Magnesium permits calcium to enter a nerve cell to allow electrical transmission along the nerves to and from the brain. Even our thoughts, via brain neurons, are dependent on magnesium.

Dr. Carolyn Dean

When dealing with autism spectrum and other neurological disorders in children, it is important to know the signs of low magnesium: restless, can't keep still, body rocking, grinding teeth, hiccups, sensitive to noise, poor attention span, poor concentration, irritable, aggressive, ready to explode, or easily stressed. When it comes to children today we need to assume a large magnesium deficiency for several reasons: The foods they are eating are stripped of magnesium because foods in general, as we shall see, are declining in mineral content in an alarming way.

The foods many children eat are highly processed junk foods that do not provide real nutrition to the body.

Most children on the spectrum are not absorbing the minerals they need even when present in the gut. Magnesium absorption is dependent on intestinal health, which is compromised totally in leaky gut syndromes and other intestinal problems that are present in the majority of autism syndrome disorders.

The oral supplements doctors rely on are not easily absorbed because they are not in the right form and because magnesium in general is not easily administered orally.

Evidence is mounting that low levels of magnesium contribute to the heavy metal deposition in the brain that precedes Parkinson's, multiple sclerosis, and Alzheimer's. Many of the symptoms of Parkinson's disease can be overcome with high magnesium supplementation. In a trial with 30 epileptics, 450 mg of magnesium supplied daily successfully controlled seizures.

Another study found that the lower the magnesium blood levels the more severe was the epilepsy. In most cases magnesium works best in combination with vitamin B6 and zinc.

Because of its nerve and muscle support, magnesium is helpful for nervousness, anxiety, insomnia, depression, and muscle cramps.

Thus magnesium is also given as part of a treatment for autism or hyperactivity in kids.

How many doctors relate the increased accumulation of mercury in the body to deficiencies in magnesium? The cause and cure of many physical illnesses can be as simple as correcting a magnesium deficiency, and many of the problems with mercury chelation can be reduced when a person is given sufficient magnesium. Everyone knows that chelation wastes minerals yet few have investigated sufficiently the key mineral whose loss cannot be tolerated without unacceptable risk.

Magnesium is very important for phase-one detoxification and it, along with other minerals like zinc, displaces toxic heavy metals from the body. Magnesium is a crucial factor in the natural self-cleansing and

detoxification responses of the body. Thus it is reasonable to assume that low levels of magnesium would render a child vulnerable to mercury mobilization during chelation.

Dr. Frederica P. Perera, Professor of Environmental Health Sciences and Director of the Columbia Center for Children's Environmental Health (CCCEH), is a leader in the field of molecular epidemiology. Molecular epidemiology is a relatively new discipline that merges highly sophisticated laboratory techniques with epidemiologic methods. This approach uses biomarkers in human tissue as indicators of potential risk of cancer and other diseases—hence is a tool in disease prevention.

Susceptibility due to nutritional deficiencies is a primary interest of Dr. Perera.

According to Dr. Sherry Rogers, Perera has indicated that there is as much as a 500-fold difference in the ability of individuals to detoxify the same chemical. One of the key markers of this difference is each individual's magnesium level. Deficiencies in magnesium will wreak havoc with almost any detoxification and chelation program.

Human exposure to heavy metals has risen dramatically in the last 50 years as a result of an exponential increase in the use of heavy metals in industrial processes and products. The need for detoxification and chelation is increasing considerably yet the exaggerated healing crises or detox side effects could easily arise and be caused solely by magnesium and other mineral deficiencies.

Dr. Leslie Fisher has treated in excess of 35,000 patients where mineral therapy was prescribed as the sole form of medication. He has conducted research within his own clinics and at the Department of Psychiatry, Austin Hospital, Melbourne. Mineral 20

therapy is the foundation upon which chelation <sup>1771</sup> treatments and protocols need to be built. An over-reliance on synthetic chelators is dangerous without appropriate mineral support therapies. In the case of autism spectrum disorders, oral

magnesium supplement plans cannot be expected to alleviate magnesium deficiencies.

Sufficient magnesium levels not only lead to safer detoxification and chelation, it makes chelation possible. Chelation therapy cannot be separated from mineral therapy. The autism community has been told by Dr. Andrew Cutler Hall many times that it is

“mineral transport” defects that are the biggest problem with heavy metal toxicity. Unfortunately the chelation community concentrates on oral supplementation, though some do use Epsom salt baths, which are relatively ineffective and more toxic than magnesium chloride when it comes to magnesium supplementation.

Transdermal/topical treatments are proving to be useful in the treatment of autism with TD-DMPS, TD-DMSA and transdermally-applied glutathione. The discovery that an important mineral like magnesium can be supplied through the transdermal route is significant. The last thing any parent or doctor treating autistic children should want to do is to miss the boat on effective magnesium supplementation. Miracles may not be what we should expect from finally getting magnesium levels up to their appropriate levels, but we should expect remarkable improvements in many areas.

## 1. Magnesium & Stroke

In my practice the use of magnesium in the early stages of a stroke has rendered the best results for my patients who have the greatest deficits.

Dr. Al Pinto

The most effective stroke treatments can only be given within the first few hours after a stroke has occurred. Once you are identified by ambulance or emergency personnel as someone who could be having a stroke, doctors need to know when your symptoms started because this is crucial in terms of effective window of treatment. With magnesium treatments, the trend toward a better functional outcome in patients at 30 days is seen when treatments are started within 24 hours from onset versus controls.



In Los Angeles, California we have what is called the FAST-MAG

trial, which has the ambulance personnel injecting magnesium quickly upon arrival of stroke victims. The Field Administration of Stroke Therapy (FAST-MAG trial) is an NIH-NINDS-sponsored study whose goal is to evaluate the effectiveness and safety of field-initiated magnesium in improving the long-term functional outcome of patients with acute stroke.

The FAST-MAG trial addresses the crucial factor of delayed time to treatment, which has hindered all past human clinical trials

of neuroprotective drugs. <sup>1772</sup> The FAST-MAG Pilot Trial

demonstrated that field initiation of magnesium in acute stroke is feasible, safe, and potentially efficacious. The basic design is to inject magnesium within 1-2 hours of onset of stroke when the benefits of neuroprotective acute stroke therapies are likely to be greatest. By utilizing field delivery via the ambulance, medical scientists are conducting the first neuroprotective study ever performed in the 0-2-hour window. Most stroke patients typically don't receive treatment within these brief windows.

Patients typically arrive at the hospital too late, and the consequences as such are great.

If you notice one or more of these symptoms in yourself or someone you are with, call 911 immediately or get to a hospital right away:

Sudden weakness or numbness of the face, arm or leg, especially on one side of the body (the most common sign of stroke) Sudden confusion; trouble speaking or understanding Sudden trouble seeing with one or both eyes Sudden trouble walking; loss of balance or coordination Sudden, severe headache with no known cause While waiting for the ambulance, if there's magnesium oil in the house the stroke victim (or a family member) can rub magnesium all over their body or can quickly get in a bath loaded with magnesium chloride. (Recommended are 2-5 pounds of magnesium flakes.) This will not replace an injection of magnesium that could be offered by the ambulance operators (but is usually not, except in L.A.), but it opens up quick intervention that can only help. Another option is to

simply drink magnesium chloride. The point is, the quicker the intervention the greater the chance of a quicker and more complete recovery.

Researchers believe that magnesium slows the chemical process that can kill 12 million brain cells per minute during an untreated stroke, leading to long-term disability and death. So every moment is crucial to outcome. At least nine preclinical studies have examined the effect of systemic magnesium sulfate upon final infarct size in animal focal ischemic stroke models.

Eight of the nine demonstrated substantial decreases in infarct size in treated animals, with reductions ranging from 26 to 61

percent.

Stroke is the third leading cause of death in the United States and the most common cause of adult disability. An ischemic stroke occurs when a cerebral vessel occludes, obstructing blood flow to a portion of the brain. Each year 700,000 Americans suffer a stroke. If they do not die on the spot, nearly 25 percent of them will die in a year from lack of appropriate treatment. Those 1.2

million Americans who have survived strokes now report serious

disabilities that affect daily living. How we treat strokes is very important; the list of disabilities of patients age 65 or over six months after they suffered their stroke is appalling.

50 percent suffer paralysis on one side of their body.

35 percent have symptoms of depression.

30 percent can't walk without assistance.

26 percent need help with daily activities.

26 percent are living in nursing homes.

19 percent have speech or language problems.

The cost to care for stroke victims in America is approximately \$54 billion. Most think that taking aspirin every day will prevent platelet aggregation (clot formation) and help prevent stroke. However, the truth is that aspirin may prevent stroke in only 3 of 100 women and does not seem to prevent stroke in men at all. Aspirin is not the correct preventive treatment for stroke and that point is driven home when we consider that aspirin causes gastrointestinal bleeding in eight out of 1,000 people and is sometimes fatal.

Early studies using rats and mice showed that if given at high concentrations, magnesium can decrease the area of the brain that is permanently lost as a result of a stroke.

Dr. Jose Vega

Dr. Gregory Lip, professor of cardiovascular medicine at the University of Birmingham, says that the majority of strokes are preventable, but under-diagnosis and poor care, as well as underuse of medicines and the side effects of drugs means stroke creates “an unnecessary and heavy burden” on patients and health systems. Stroke is the most common cardiovascular problem after heart disease and kills an estimated 5.7 million people worldwide each year.

“How does magnesium protect the injured brain?” asks Dr. Vega.

“The response to a lack of oxygen and nutrients (i.e., ischemia) by the brain includes a local release of chemicals that can damage brain cells even beyond the damage that can be expected by ischemia alone. Perhaps the most harmful of these chemicals is glutamate, an amino acid used in very low amounts by brain cells to communicate with each other. During a stroke, however, the massive amount of glutamate released produces a flood of calcium inside brain cells, which in turn causes them to die prematurely.

Magnesium is thought to have the ability to prevent glutamate from causing this flood of calcium in the cells, thus protecting them from premature death.

Dr. Vega continues, “If magnesium infusion is found to be an effective approach for the treatment of acute stroke, it would be a much needed

addition to the current armamentarium of medical therapies for acute stroke. Currently, less than 10 percent of stroke patients can benefit from tissue plasminogen activator (TPA) infusions partly because of the 3-hour limit after the onset of stroke symptoms in which it can be used, and partly because it is contraindicated in hemorrhagic strokes.”

Magnesium deficiency can cause metabolic changes that may contribute to heart attacks and strokes.

National Institute of Health

Dr. Tavia Mathers and Dr. Renea Beckstrand from Brigham Young University published in the Journal of the American Academy of Nurse Practitioners in 2009 that magnesium has been heralded as an ingredient to watch for in 2010 and noted that magnesium is 20

helpful for reduction of the risk of stroke. <sup>1773</sup>

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Dr. Saver and colleagues <sup>177 74</sup> investigated the neuroprotective effect of early magnesium infusion in ischemic or hemorrhagic stroke in the field; three quarters of the infarct cohort were treated within two hours of onset and nearly one-third within one hour of onset. Dramatic early results were reported in the early-stage (42 percent of < 2-hour infarct patients) and good results in the 90-day global functional outcomes (69 percent of all patients and 75 percent of < 2-hour infarct patients).

Low CSF Mg<sup>+2</sup> levels in patients with

acute ischemic stroke at admission

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predicted a higher one-week mortality. <sup>177 75</sup>

An essential prerequisite for any pharmacological agent to offer significant brain neuronal protection during strokes is its ability to freely cross the

blood-brain barrier. Several studies show that magnesium crosses this barrier in both animals and in 20 20

humans.<sup>177 76</sup> Magnesium ions cross the intact blood-brain barrier efficaciously so that intravenous magnesium sulfate significantly raises cerebrospinal fluid and brain extracellular fluid magnesium to supraphysiologic levels.

Magnesium sulfate is neuroprotective in preclinical models of cerebral and spinal cord ischemia, excitotoxic injury, and head trauma. Magnesium is economical, widely available, simple to administer, and has a long-established safety and tolerability profile in myocardial infarction and eclampsia as well as in pilot human focal stroke studies. Unlike most synthetic neuroprotective compounds, parenteral magnesium has no major adverse effects in doses that achieve serum levels in the range of preclinical neuroprotective concentrations.

Dr. Sarah Pendlebury, a senior clinical fellow at the Stroke Prevention Research Unit of John Radcliffe Hospital in Oxford and lead author of a report published online in September 2009 in *The Lancet Neurology* says:

“First, there is a clear relationship between having multiple strokes and the risk of dementia,” Pendlebury said. “If someone has multiple strokes at the same time, that person has a strong risk of becoming demented in the first month. Second, the data suggest that the presence of complications after stroke—such as hypertension, low oxygen saturation, cardiac events, and seizures

—also increases the risk of developing dementia. Because of this,” Pendlebury said, “the focus of stroke treatment units should be on all the risk factors for stroke. So, to prevent worsening of damage to the brain, the patient must be maintained in as stable a condition as is possible,” she said. “We must prevent either high or low blood pressure and maximize all other secondary prevention measures.”

The way to reduce the chances of developing dementia such as Alzheimer’s disease after a stroke is to prevent a second stroke by concentrating on all the known stroke risk factors, a new British study suggests. Magnesium

plays a significant role in relaxing the blood vessels, an effect generally proven to help lower blood pressure. When blood vessels are constricted—not relaxed—the heart works harder to pump blood through the body, causing blood pressure to increase.

According to the current European treatment guidelines, no neuroprotective treatment 20 20

is recommended for stroke patients. <sup>177 77</sup>

Dr. Jerry Nadler says, “Higher dietary intake of magnesium was among the factors associated with a reduced risk of stroke in men with hypertension. In a survey of almost 45,000 men ages 40-75, the overall risk of stroke was significantly lower for men in the highest quintile of intake of potassium, magnesium, and cereal fiber, but not of calcium, compared with men in the lowest quintile of intake. A similar relationship was reported this year by Meyer and colleagues, who observed that a diet rich in magnesium, grains, fruits, and vegetables reduced the likelihood of developing type 2 diabetes in a group of almost 36,000 women.

While no consistent effect of magnesium on blood pressure has been noted among persons with diabetes, a significant blood pressure reduction was noted in diabetic patients with hypertension after dietary sodium was replaced with potassium and 20 20

magnesium.” <sup>177 78</sup>

Magnesium is an agent with actions on the N-methyl-D-aspartate (NMDA) receptor and has a low incidence of side effects. It may reduce ischemic injury by increasing regional blood flow, antagonizing voltage-sensitive calcium channels, and blocking the

NMDA receptor. Using various mechanisms, neuroprotective agents attempt to save ischemic neurons in the brain from irreversible injury. Studies in animals indicate a period of at least four hours after onset of complete ischemia in which many potentially viable neurons exist in the ischemic penumbra.

Intravenous magnesium sulfate administration during the hyper acute phase of stroke was shown to be safe in a small, open-label pilot trial in which more than 70 percent of patients were treated less than two hours from symptoms onset.

More than four out of five strokes are due to ischemic infarction. Unfortunately, current therapies for acute ischemic stroke are of extremely limited effectiveness. To date, the only FDA-approved treatment for acute ischemic stroke is intravenous tissue plasminogen activator (TPA), a thrombolytic agent that must be administered within three hours of symptom onset and only after neuroimaging has ruled out intracerebral hemorrhage.

Current estimates are that only 1-3 percent of acute ischemic stroke patients in the U.S. receive TPA. The only other agent of proven utility in acute ischemic stroke is aspirin, which confers only minimal benefit, helping only one of every 110 patients treated.

When focal occlusions disrupt blood flow to the brain, a cascade of molecular events producing cell injury ensues. Cell death proceeds rapidly in the infarct core where blood flow is most drastically curtailed, but more slowly in the ischemic penumbra where blood flow is variably reduced and molecular elaboration of neuronal injury may proceed over hours. Central molecular events in the ischemic cascade include accumulation of intracellular calcium, release of excitatory amino acid neurotransmitters, generation of oxygen-free radicals, nitric oxide formation, and the release of cytokines by infiltrating polymorphonuclear leukocytes.

The ideal neuroprotective agent for stroke would be inexpensive, readily available, easy to administer, and have no significant adverse side effects. An agent demonstrated to be safe and potentially beneficial in both ischemic and hemorrhagic stroke would have the added benefit of potentially earlier administration prior to obtaining a head CT scan. Intravenous magnesium sulfate offers promise as just such an agent.

Systemically-administered magnesium at doses that double physiological serum concentration significantly reduces infarct volume in animal models

of stroke, with a window of up to six hours after onset and favorable dose-response characteristics 20 20

when compared with previously tested neuroprotective agents. <sup>177</sup> 79

Dr. Pinto explains, “Magnesium, an important cofactor in metabolism and protein synthesis, joins into a complex with adenosine triphosphate. Magnesium inhibits the release of excitatory neurotransmitters at the presynaptic level and blocks

voltage-gated calcium channels. Moreover, it has been shown to suppress anoxic depolarization and cortical spreading depression—

both potential targets for neuroprotective treatment. Magnesium also exerts vascular effects such as boosting vasodilation, increasing the cardiac output and prolonging bleeding time.

Magnesium homeostasis in the central nervous system is regulated by active transport, and its concentration in cerebrospinal fluid (CSF) is maintained at levels higher than serum levels. With intravenous administration, magnesium concentration in CSF can be increased with a peak at four hours.”

Health experts warned at the end of 2009 of a stroke crisis in Europe that is already costing the region’s economy an estimated \$56 billion a year, with numbers expected to rise as populations age.

## 1. Magnesium in Heart Health

Magnesium is absolutely essential for the proper functioning of the heart. Magnesium’s role in preventing heart disease and strokes is generally well accepted, yet cardiologists have not gotten up to speed with its use. Magnesium was first shown to be of value in the treatment of cardiac arrhythmias in 1935. Since then there have been numerous double-blind studies showing that magnesium is beneficial for many types of arrhythmias including atrial fibrillation, ventricular premature contractions, ventricular tachycardia, and severe ventricular arrhythmias.



Magnesium supplementation is also helpful in angina due to either a spasm of the coronary artery or atherosclerosis.

Heart palpitations, “flutters,” or racing heart, otherwise called arrhythmias, usually clear up quite dramatically on 500 milligrams of magnesium citrate (or aspartate) once or twice daily, or faster if given intravenously.

Dr. H. Ray Evers

A magnesium deficiency is closely associated with cardiovascular disease.<sup>178 70</sup> Lower magnesium concentrations have been found in 20 20

heart attack patients,<sup>178<sup>1</sup></sup> and administration of magnesium<sup>178<sup>2</sup></sup> 20

has proven beneficial in treating ventricular arrhythmias.<sup>178<sup>3</sup></sup> , 20 20  
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<sup>178 74</sup> , <sup>178 75</sup> , <sup>178 76</sup> Fatal heart attacks are more common in areas where the water supply is deficient in magnesium and the average intake through the diet is often significantly less than the 20 20

200-400 milligrams required daily.<sup>178 77</sup>

Magnesium is proving to be very important in the maintenance of heart health and in the treatment of heart disease. Magnesium, calcium, and potassium are all effective in lowering blood 20 20

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pressure. <sup>178 78</sup> , <sup>178 79</sup> , <sup>179 70</sup> , <sup>179<sup>1</sup></sup> Magnesium is useful in preventing death from heart attack and protects against further 20

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heart attacks. <sup>179<sup>2</sup></sup> , <sup>179<sup>3</sup></sup> It also reduces the frequency and severity of ventricular arrhythmias and helps prevent complications after bypass surgery.

Almost all enzymatic processes using phosphorus as an energy source require magnesium for activation. Magnesium is involved in most biochemical reactions such as glycolysis and oxidative phosphorylation. Shifts in intracellular magnesium concentration have an effect on cell energy levels because magnesium is bound to adenosine triphosphate (ATP) inside the cell. It is very interesting to note that bicarbonate ions are involved in transporting magnesium into the mitochondria, thus deficiency of bicarbonate (acidosis) have a direct bearing on the heart tissues.

Cardiac cells are adapted to be highly resistant to fatigue—they have a large number of mitochondria, enabling continuous aerobic respiration.

Magnesium deficiency plays a critical role in the development of cardiovascular disease because magnesium is needed within the cells for the production of energy, which is essential for our heart muscles. “Mg<sup>2+</sup> is critical for all of the energetics of the cells because it is absolutely required that Mg<sup>2+</sup> be bound (chelated) by ATP, the central high-energy compound of the body.

ATP not bound with Mg<sup>2+</sup> cannot create the energy normally used by specific enzymes of the body to make protein, DNA, RNA, or transport sodium/potassium/calcium in and out of cells or to phosphorylate proteins in response to hormone signals, etc. In fact, ATP without enough Mg<sup>2+</sup> is non-functional and leads to cell 20 20

death,” says Dr. Boyd Haley. <sup>179 74</sup>

Dr. Matthias Rath said, “It is a well-known fact—confirmed in numerous clinical studies—that deprivation of cardiac energy is the most important factor in developing heart failure and irregular heart rhythm. The human heart is a muscle that requires tremendous amounts of bio-energy to support its beats (100,000

times per day for life) and to provide strength to recycle the blood through the body. This energy is produced in our cells in the form of ATP molecules and our heart uses lots of them—about 6

kilograms (more than 12 pounds) of ATP per day.”

Magnesium chloride is first aid for the heart.

If you’re ever rushed to the hospital with a heart attack, intravenous magnesium could save your life. In a 1995 study, researchers found that the in-hospital death rate of those receiving IV magnesium was one-fourth that of those who received standard treatment alone. In 2003, a follow-up study of these same patients revealed an enduring effect of magnesium treatment.

Nearly twice as many patients in the standard treatment group had

died compared to those who received magnesium, and there were considerably more cases of heart failure and impaired heart function in the placebo group. In addition to increasing survival after heart attack, IV magnesium smoothes out arrhythmias and improves outcomes in patients undergoing angioplasty with stent placement.

Studies have also demonstrated that magnesium plays an important role in regulation of blood catecholamine concentrations, particularly epinephrine and norepinephrine, and increased concentrations of those hormones exert adverse effects on the myocardium often causing life-threatening disorders. This problem is particularly important in cases of stunned myocardium observed after extracorporeal circulation procedures and may be even more  
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relevant in underweight patients. <sup>179</sup> 75

In a related study, a group of 40 men were divided into two groups and half were given preoperative oral magnesium supplementation; the other half were not. Measurements of magnesium, epinephrine, and norepheniphrine were taken before, during, and after surgery. The findings were that magnesium levels dropped and epinephrine and norepinephrine levels elevated as a result of surgery in both groups, but to a significantly greater extent in the group that did not receive the supplements.

They concluded that magnesium supplementation prior to surgery substantially reduces intraoperative and postoperative disorders.

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<sup>179</sup> 76

The timing and doses of magnesium are critical especially in cases of stroke or heart failure. The FAST-MAG (Field Administration of Stroke Therapy-Magnesium) trials in Los Angeles illustrate the beneficial effects of early magnesium administration by paramedics when stroke first occurs. Each year in the U.S., over 750,000 Americans suffer a symptomatic stroke.

The FAST-MAG trial was designed to address the crucial factor of delayed time to treatment, which has hindered past human clinical trials of neuroprotective drugs. Animal studies suggest the duration of the therapeutic window is very brief, generally less than 2-3 hours.

Cardiac arrhythmias and coronary artery vasospasm can be caused by magnesium deficiency and intravenous magnesium reduces the risk of arrhythmia and death 20 20

immediately after acute myocardial infarction. <sup>179</sup> 77

A study published in The Lancet reported the effects of a double-blind, randomized, placebo-controlled study in 2,316 patients with suspected myocardial infarction. The dose of magnesium was high (about 8.7 grams given intravenously over a 24-hour period), but the results were remarkable—magnesium reduced cardiovascular

mortality. Teo and colleagues, in an analysis of seven clinical studies, concluded that magnesium (in doses of 5-10 grams by intravenous infusion) reduced the odds of death by an astounding 55 percent.

Although intravenous magnesium is the drug of choice at the onset of a heart attack, it is not mentioned in the section

on arrhythmias in the 1989 “Compendium of Drug Therapy.”

Dr. H. Ray Evers

Dr. Sarah Myhill has been using IV magnesium in her general practice for over 15 years for both acute and chronic problems.

She uses it for all patients with acute chest pain (unless the blood pressure is very low), acute heart failure, pulmonary embolus and acute asthma. Myhill says, “It is a potent vasodilator—i.e., it opens up all the blood vessels. Indeed patients can feel their blood vessels dilating as I give them the magnesium—they warm up all over! This has the immediate effect of reducing the work of the heart and opening up the co-lateral circulation of the heart. Most of the patients with acute heart attacks have their pain completely relieved by IV magnesium.”

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179 78

Myhill continues, “It protects against ‘stunning’ or reperfusion injury. After an acute heart attack, the muscle dies and becomes the infarcted area. With recovery there may be renewed blood supply to the damaged area. The damaged heart muscle may not be able to cope with the renewed oxygen supply and suffer stunning—

an acute—loss of its contractile ability. This may explain deaths that occur a few hours or days after the initial infarction. In the many patients where I have injected magnesium prior to admission to the hospital, I have never had a patient die subsequently. Indeed I can relieve pain quickly and send

them on greatly reassured that all will be well. This technique was taught to me by Dr. Sam Browne who documented his cases (

Journal of Nutritional Medicine , 1994, 169-177).”

This book puts out a universal call to cardiologists and all other healthcare practitioners interested in heart health to put magnesium as the lead item in their medical protocols. The evidence is overwhelming; magnesium is the perfect heart drug , but fortunately for us it is not a drug at all but a safe nutritional concentrate in its chloride form.

Once there is an active heart problem, the importance of magnesium actually increases considerably. This has actually been noted in medical research since the 1950s.

Christopher Barr There is no allopathic drug that comes anywhere close to magnesium in effectiveness. Its pharmacological profile is broad, deep and safe where just about every pharmaceutical carries with it a minefield of dangerous side effects including the further lowering of precious magnesium levels. Magnesium in ancient China was already known as the “beautiful metal.” When it comes to heart health, magnesium is beautiful and its effects are nothing less than medically stunning.

Dr. Matthias Rath believes heart attacks and strokes are not true diseases, but the result of nutritional deficiencies. “Heart disease is not caused so much by what you eat as by what you 20 20

don’t eat. <sup>179</sup> 79 It is difficult for the average person to understand that the nutrients such as beta-carotene, vitamins A, C and E, and the mineral selenium are more important to heart health than how much cholesterol is in their diet,” writes veteran research biochemist Dr. Richard A. Passwater. Add magnesium to that list along with niacin, which is the original cholesterol-lowering medicinal, and we have a protocol that wipes out all rational (or irrational) defenses the pharmaceutical companies use to promote their dangerous ineffective drugs.

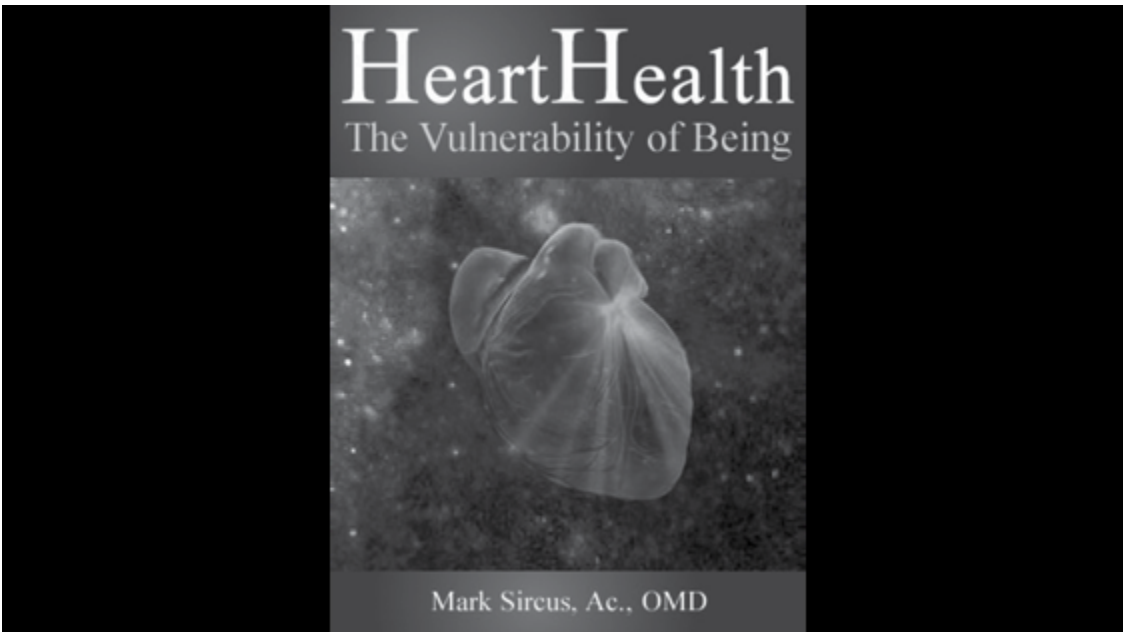
The heart requires optimum fuel for optimum performance; it needs magnesium. Magnesium is nutritional oil to the heart; it lubricates and

facilitates its function. As our magnesium levels drop, the chances of our heart muscle seizing up increases. It is scientifically impossible, thus medically insane, to deny the physiological importance of magnesium, and for cardiologists, the message is a clarion call. Though magnesium deficiency is threatening to all major systems of the body, it strikes hardest and most suddenly against the cardiovascular system.

As much as 50 percent of the population may have some form of heart disease, metabolic syndrome or full-blown diabetes. Most of these people are waiting for some dramatic event before they will take what is happening in their heart seriously. They eat too much of the wrong foods and not enough of the right ones, don't do any exercise, and they take many pharmaceuticals that speed along the process of cardiac degeneration. Universally, people tend to ignore small warning signals, then the wake-up call comes suddenly in the form of a heart attack and the person drops dead on the spot. But to top it all off, people are directed to believe that the wrong foods are good for us, convenience and processed foods are healthy (or at least harmless), and that our bodies can deal with the myriad of toxins we are exposed to everyday. Each of these things is contributing to the deterioration of cardiac health.

It is not an exaggeration to say that miracles in cardiac medicine would be achieved if the overwhelming preponderance of magnesium deficiency—in adults, adolescents, and the very young—

were addressed instead of ignored. But cardiologists are enamored



by the ability of statin drugs to reduce cholesterol levels. They call statins “miracle drugs,” claiming that they cause no side effects; they are now hinting that everyone over age 40 should be taking a statin. The medical literature is filled with hundreds of studies validating magnesium’s safety and beneficial effects, whereas scientific studies are increasingly showing statins to be a dangerously bad idea.

### 1. Magnesium & Vascular Disease

Magnesium is an important determinant of vascular tone, contractility, and reactivity. Magnesium is necessary for muscles to relax. So a deficiency will cause arterial muscle spasm with consequent rise in blood pressure.

Dr. Sarah Myhill

Magnesium deficiency is directly correlated with most cardiovascular problems, including high blood pressure.

Epidemiological studies have conclusively shown an inverse relationship between dietary magnesium intake and blood pressure.



<sup>270</sup> Magnesium is also considered to be a natural calcium channel <sup>20</sup>

blocker and vasodilator <sup>270</sup><sup>1</sup> that may be helpful for patients with mild hypertension. Many diuretics often used for patients with high blood pressure cause potassium and magnesium depletion.

Often times magnesium supplements are prescribed for patients <sup>20</sup>

taking thiazide and loop diuretics. <sup>270</sup><sup>2</sup>

Dr. Jay Cohen, author of Toxic Dose , tells us in a recent Life Extension article, “ High blood pressure is an even stronger predictor of cardiovascular risk than high cholesterol.

Scientific studies directly correlate high blood pressure with decreased longevity. Yet most mainstream physicians and their

patients ignore this risk until life threatening hypertension has already developed, though damage may be well established prior to discovery.” He goes on to say that, “a well-established body of research indicates that nutrients such as magnesium are highly effective in treating and—even more importantly—preventing high blood pressure. Because this metallic element is not plentiful in foods, magnesium supplementation may be effective in both <sup>20</sup>

preventing and controlling high blood pressure.” <sup>270</sup><sup>3</sup> Others such as Dr. Sherry Rogers and Dr. Carolyn Dean have written extensively about magnesium’s benefit in controlling hypertension.

Lower amounts of magnesium

lead to higher blood pressure.

A recent Swedish study found a dramatic drop in blood pressure from taking magnesium supplements. After nine weeks systolic blood pressure went down from 154 to 146 and diastolic pressure from 100 down to 92 in patients taking about 360 milligrams of magnesium daily, which is actually a very low dose.

The brain provides nerves connecting to muscles in the blood vessel walls, telling them either to contract or relax. If this automatic control is damaged... then postural hypotension is one result.

Dr. Sarah Myhill

According to Dr. Myhill, blood pressure is created as a combination of three factors. In order of importance: Peripheral resistance—i.e. how open are the arteries [the blood vessels that carry oxygen and nutrients from the heart to the rest of the body].

How hard the heart is working. The heart is responsible for 60 percent of blood flow. The other 40 percent is generated by the muscular walls of arteries. Arteries pick up the pressure wave sent out from the heart and add their own booster in a wave of contraction that flows down arterial walls.

The blood volume, and to a lesser extent, the “thickness” of the blood.

Blood arteries are actually very sensitive and narrow or get inflamed as a result of arteriosclerosis, which itself is caused by a multitude of factors including magnesium deficiency. Dr.

James Howenstine says, “Arteriosclerosis is primarily a nutritional disorder that should not be expected to respond to surgical therapy with bypass surgery, angioplasties, and stent

placement as these operations do nothing to repair the deficiencies.”

Magnesium prevents blood vessels from constricting, thus warding off rises in blood pressure, strokes, and heart attacks. Magnesium inhibits the release of thromboxane, a substance that makes blood platelets stickier.

Dr. Jerry L. Nadler

Angina

Angina pectoris is pain or discomfort due to lack of oxygen to the heart muscle.

The heart has many blood vessels, not just the cardiac arteries.

The heart muscle is very powerful and is fueled by these blood vessels that also act as the route by which toxins and waste products are eliminated from the heart. If calcium levels are too high and magnesium levels too low the heart cells themselves will have trouble eliminating their wastes into the blood and will have an equally difficult time taking up vital nutrients. If the blood is too thick, it doesn't flow through these tiny vessels efficiently and doesn't efficiently clean up the wastes coming out of the cells. The heart becomes acidic, cells begin to die, and eventually one will have a heart attack.

Magnesium has long been assumed

to have anticoagulant properties.

Blood that is too thick can lead to blood clots. Thick blood may lead to a condition called deep venous thrombosis. Sometimes a piece of clot breaks off to create a life-threatening condition called pulmonary embolism. Sometimes thick blood causes clots in arteries rather than veins. A blood clot forming in the neck arteries may travel to the brain and cause a stroke. A blood clot forming in the arteries of the heart can result in a heart attack. Blood clots cause problems in the affected organ by cutting off oxygen flow.

Not all blood clots are caused by thick blood. Blood clots leading to heart attacks and strokes can be formed when thin blood comes into contact with plaque, which triggers a blood clot. Some blood clots result from sluggish blood flow or poor circulation. An irregular heartbeat called atrial fibrillation causes blood clots because of sluggish blood flow through the heart.

Metabolic Syndrome

More than one in four American adults have metabolic syndrome 20 20

according to the latest government estimates,<sup>270 74</sup> and recent reports to the American Diabetes Association at their 2006

symposium report that half of all Americans will develop a condition known as insulin resistance, a type of “pre-diabetes”

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that puts them at high risk of heart attacks.<sup>270 75</sup> The March 27, 2006 issue of *Circulation* discussed the role magnesium might play in preventing this serious syndrome. A 15-year study looked at the magnesium intake of 4,600 people aged 18-30. They found that people with the highest intake of magnesium had a 31 percent lower risk for metabolic syndrome when compared with the group with the lowest magnesium intake.

Dr. R. Keith Campbell, a distinguished professor of pharmacy at Washington State University told a gathering of pharmacists that clinicians should add magnesium supplements to the treatment of metabolic syndrome.

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<sup>270 76</sup> “People with elevated blood glucose levels—one of the abnormalities that constitute metabolic syndrome—lose magnesium in their urine.” A week after Campbell spoke, the American Heart Association journal *Circulation* published online the article suggesting an inverse relationship between magnesium intake by healthy young adults and the risk of metabolic syndrome in later years.

## Hypertension

Epidemiologic studies confirm that hypertension is correlated with low magnesium levels.

Through the years there has been extensive research on the effects of magnesium on hypertension and its calcium channel blocking effects have been known and accepted. But supplementation with magnesium continues to be ignored in favor 20 20

of prescription drugs.<sup>270 77</sup> These drugs treat the symptoms of hypertension and do not address the underlying cause, and even worse, the drugs often cause more depletion of magnesium.

Fifty million Americans have high blood pressure. “Americans now 55 or over face a 90 percent chance of developing high blood pressure, or hypertension, a major risk factor for heart attacks, strokes, congestive heart failure, circulatory failure, kidney disease, and loss of vision.” More than 15 million (more than 30

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percent of the 50 million) are undiagnosed.<sup>270 78</sup>

Dr. Lawrence Resnick, professor of medicine and director of hypertension at Wayne State University, studied the blood pressure of patients who were both diabetic and non-diabetic. He found that all patients with hypertension, whether diabetic or non-diabetic, had lower magnesium levels than people with normal blood pressure.

Resnick says he has treated patients who were hypertensive in spite of taking one or two medications to treat this disease, and 20 20

that by adding magnesium, their pressure returned to normal.<sup>270 79</sup>

Researchers at Case Western Reserve University report in the August 2002 issue of *Nature* how magnesium activates microscopic ion channels in the membrane of a cell. These particular ion channels are important in controlling blood pressure.

“Research of this kind may help us understand why some therapies such as magnesium supplements are important in the prevention and management of hypertension or heart failure,” said Dr. Jianmin Cui, the lead researcher and assistant professor in the department of biomedical engineering at CWRU. “Along with some other groups, we have discovered that when magnesium is applied to calcium-activated potassium channels, these channels will open. We know from literature that the opening of these channels can reduce blood pressure.” Hypertension, Cui explained, results

from the contraction of blood vessels, which causes an increase in blood pressure. “The diameter of blood vessels is controlled by smooth muscle cells around them,” he said.

Magnesium has been added to salt preparations with 20

significant blood-pressure-lowering effects. <sup>2170</sup>

Magnesium supplementation produced a significant reduction of plasma cholesterol and LDL cholesterol and an increase of HDL

cholesterol. These results suggest that oral supplementation of magnesium would be helpful for hyperlipidemia patients with noninsulin-dependent diabetes mellitus. <sup>211</sup>

## 18 . Why Don't Cardiologists Use Magnesium?

I didn't learn about magnesium in medical school.

Few doctors do. I learned about magnesium the hard way, 28 years later. In 1995, I developed a baffling, painful, abnormal blockage of the blood flow to my legs.

Dr. Jay S. Cohen

Magnesium chloride is the perfect medicine for cardiologists. It is the nutritional medicinal with pharmaceutical properties that no allopathic drug can hope to equal, yet doctors routinely ignore it. Worse, they use calcium channel blockers, statin drugs and other questionable substances with nightmarish side effects.

Though magnesium is safe and easy to use and is available for immediate use in emergency departments, rarely is its full potential appreciated or harnessed. <sup>212</sup>

Studies show over 75 percent of Americans are dangerously deficient in magnesium.

The link between magnesium deficiency and sudden death by cardiac arrest is suggested by a significant number of studies published from epidemiologic, autopsy, clinical, and animal studies over the past several decades. Cardiac arrhythmias have been routinely associated with magnesium dis-equilibrium, including ventricular tachycardias, fibrillations, and ectopic beats. Coronary spasm is a major pathogenic feature of hypo-magnesemia. So why don't doctors use more magnesium?

Dr. Sarah Myhill speculates that one of the reasons magnesium is NOT used as a first treatment has to do with an old piece of research that was deemed irresponsibly done where patients were given 80 times the safe dose of injectable magnesium, which caused some deaths.<sup>213</sup> ( See the reference for Dr. Myhill's full report—"Why isn't magnesium routinely used in heart disease?") Dr. Sarah Myhill states: "There have been many studies showing that magnesium is clearly beneficial in heart disease. The trouble is the drug companies do not want to know. Magnesium is a serious competitor to their money-making pharmaceuticals. And so they set up a study to deliberately blacken the name of magnesium."

"In this study (set up by a drug company who manufactures statins, surprise, surprise), magnesium was given to patients during the first 24 hours of a heart attack. The study was set up with a dose of magnesium that was far too high. Patients died in the study because of magnesium poisoning. When I treat patients with magnesium during a heart attack I give them 8 mmols of magnesium. These patients were given 80 mmols over 24 hours. As a result, reports came out stating that magnesium was dangerous,"

continues Myhill.

Magnesium is nothing short of a  
miracle medicine for cardiologists.

Dr. Carolyn Dean, author of *The Magnesium Miracle*, says, "One of the agreed upon signs of diabetes is low magnesium. But that's not even considered. By now you have a patient who is on four drugs to treat an

underlying magnesium deficiency and scared to death they have heart disease and afraid to come off their drugs.

In this whole six-month scenario, magnesium levels are never tested. Even if some bright young resident runs a magnesium test, it will be the wrong one because only one percent of the body's magnesium is in the bloodstream. The magnesium in the bloodstream 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.”

In a separate volume entitled *New Paradigms in Diabetic Care* , magnesium is presented to the diabetic community as an essential medicinal for the prevention and care of both type 1 and type 2

diabetes. Diabetes and heart and vascular disorders overlap—all

having their roots in magnesium deficiencies. According to conventional medicine, diabetes is considered a “risk factor” for cardiovascular disease, with a diabetic person having a 20

percent chance of developing heart-related problems within ten years. Magnesium is a common denominator for most chronic life-threatening diseases.

Claudia French, RN says, “Magnesium is only now being investigated properly for its value in early administration at the first signs of ischemic stroke (FAST-MAG). Medics are given authority to administer magnesium within the first few minutes of contact with stroke victims, yet with much more evidence over a much longer timeframe, magnesium is relegated to a lower status in the emergency treatment of heart attacks. As has already been emphasized, there is a very low risk of toxicity or adverse effects when used properly, and magnesium should be the very first agent administered, whether it's in the form of IVs or transdermal. If you suspect your family member or loved one is having a heart attack, the first thing to do is to apply magnesium oil before the ambulance even gets to your location.

You could easily be saving your loved one's life!”



I've spoken to heart specialists and asked why they go all the way through the five different types of drugs used for acute heart attack patients, and then as number six give them magnesium. They say, "Well, when we finally get to the magnesium, it always works."

Dr. Carolyn Dean

Magnesium medicine is nutritional medicine, not allopathic medicine. This makes doctors very uncomfortable because they know next to nothing about nutrition; it is not part of their basic medical training. Dr. Dean says, "Doctors don't give supplements.

They're too common. It's just not something that even I learned about in medical school, so doctors do not feel comfortable, it seems, prescribing dietary supplements. When they go through six to ten years of medical school and internships and residencies, they figure if they haven't learned it in their training, then it doesn't exist. They do not learn nutrition and they do not learn dietary supplements, and they shy away from them."

Why have trials of magnesium therapy in MI produced inconsistent results? A plausible explanation is that trials administer magnesium

at different times after infarction. Best results are obtained with the

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least delay in infusing magnesium after the ischemic event. <sup>2174</sup>

Dr. Michael Shechter This is too bad because magnesium chloride is the best possible medicinal substance in cardiac medicine . Magnesium sulphate (MgSO<sub>4</sub>) has also been commonly used in a 50 percent solution injected intramuscularly and intravenously into patients with peripheral vascular disease (including gangrene, claudication, leg ulcers and thrombophlebitis), angina, acute myocardial infarction (AMI), non-haemorrhagic cerebral vascular disease and congestive cardiac failure. A powerful vasodilator effect with marked flushing was noted after intravenous (IV) injection of 4-12 mmol of magnesium and excellent therapeutic results were 20

noted in all forms of arterial disease. <sup>21</sup>75

People who take in low amounts of magnesium are more apt to have heart disease, according to about 20 worldwide population studies.

Dr. Ronald Elin

Below is a typical kind of report we find that is just one more reason we will continue to find magnesium shunned by the western medical establishment. It's an article from Obstetrics & Gynecology on June 29, 2007, "Magnesium sulfate has more side effects than nifedipine or tocolytic." Before one reads this article below or articles on the website it is helpful to understand that magnesium sulfate is thought to be more toxic than magnesium chloride when injected and it is also important to note that injections or intravenous applications are much more problematic than transdermal and oral applications of magnesium salts.

The drug most commonly used to arrest preterm labor, magnesium sulfate, is more likely than another common treatment to cause mild to serious side effects in pregnant women, according to a study from researchers at Lucile Packard Children's Hospital and Stanford University School of Medicine. Their findings suggest that, since the effectiveness of the two drugs appears similar, physicians should consider side effects more strongly when choosing which drug to prescribe. Newborns whose mothers had received magnesium sulfate were also more likely to be admitted to the neonatal intensive care unit than those whose mothers had received the alternative treatment, although the data do not offer an explanation for this finding and more research needs to be conducted to rule out other causes. What is clear is that currently available treatments for preterm labor are far from perfect.

"There is no free lunch with any of these drugs," said Deirdre Lyell, MD, a specialist in high-risk obstetrics at the hospital's Johnson Center for Pregnancy and Newborn Services. "But magnesium sulfate has some particularly unpleasant side effects, including

vomiting, lethargy and blurry vision. The alternative treatment, nifedipine, often leaves women feeling better."

Side effects are particularly important for women struggling with the risk of premature birth and the rapid medical decisions that might need to be made about the care of their newborn. Lyell, assistant professor of obstetrics and gynecology at the medical school, and Yasser El-Sayed, MD, associate professor of obstetrics and gynecology at the medical school, are the lead and senior authors respectively of the research, which will be published in the July issue of *Obstetrics & Gynecology*. The study is the largest multicenter trial that randomized the use of the preterm labor drugs to compare outcome.

Preterm labor is defined as labor before 37 weeks' gestation.

Although it's not always possible to prevent premature birth, physicians strive to delay delivery for at least 48 hours. The extra time allows a doctor to arrange to transfer the woman to a medical facility experienced in treating premature infants and helps maximize the effectiveness of steroids used to help the fetus to prepare for the harsh outside world.

Magnesium sulfate, nifedipine and other preterm labor treatments, called tocolytics, are thought to work by relaxing overactive uterine muscles and halting ongoing cervical changes that may lead to delivery. But it's not been clear if one is better than the others. Force of habit has dictated the use of magnesium sulfate by many physicians in the absence of a compelling reason to choose an alternative.

Lyell and El-Sayed and their collaborators randomly assigned 192

patients at Packard Children's Hospital or Santa Clara Valley Medical Center who were in preterm labor to receive either magnesium sulfate, which is an intravenous treatment, or nifedipine, an oral treatment. They found that magnesium sulfate was more effective in achieving the study's primary outcome—

preventing delivery for 48 hours with uterine quiescence. But there were no significant differences in the treatments' ability to delay delivery, in the gestational age of the newborn, or in the birth weight of the infants. The researchers speculate that this seeming contradiction could be explained if

nifedipine, rather than stopping a woman's contractions, simply renders them clinically ineffective.

However, two-thirds of the women who received magnesium sulfate experienced mild to severe side effects such as shortness of breath and fluid buildup in the lungs during the treatment. In contrast, one-third of the women who received nifedipine experienced side effects of the treatment, including headaches.

Nifedipine is commonly used to treat high blood pressure and heart disease.

"The take-home message is that we saw no differences in relevant outcomes between the two groups," said Lyell, "but there was a

significant difference in the side effects experienced by the women, and some of these were very serious."

Lyell and El-Sayed emphasized that magnesium sulfate is still an appropriate treatment for preterm labor. It continues to be used regularly both at Packard Children's Hospital and Santa Clara Valley Medical Center. But they believe it may be time for physicians to give more weight to expected side effects when considering what to try first.

"It's been my experience that women who have had magnesium sulfate remember it; they don't like it," said Lyell. "Those who receive nifedipine don't feel as bad. These drugs are prescribed under what are already very difficult circumstances for the patients, and side effects are very important to them."

**Doctor's Testimony with Early Magnesium Experiences** Dr. Tony Dajer, a contributor to Vital Signs since 1989, working in the emergency room of New York University's Downtown Hospital, recounts his early experiences with magnesium. (See reference for 20

unedited full version. <sup>2176</sup> )

I knew just the right drug to calm my patient's racing heart. I just had no proof it would work.

“Magnesium?” Winnie asked, keeping her tone as loose as an unwinding coil of slack line. “Magnesium?”

“Yup. Magnesium,” I repeated. “One grain IV.”

I caught her lingering look, but Winnie and I go back six years.

Once she was sure I meant it, she produced the vial. “One grain, coming up.”

Mrs. Wu, our elderly patient, had come in gasping for air. She had been shopping with her daughter when suddenly her legs lost power and her lungs grew tight. As soon as Mrs. Wu arrived, Winnie had put her on oxygen; now she seemed a little better. But she still clutched her daughter’s hand and kept up a steady singsong of Cantonese: “Maybe Chinese medicine...” I imagined her saying, then the daughter soothing, “It’s the hospital. They know.”

Mrs. Wu’s electrocardiogram—the tracing of electrical activity in the heart—looked like a Jackson Pollock. Instead of a smooth tracing bringing forth 80 beautifully spaced spikes a minute, it was spitting out a rapid-fire and asynchronous 140 spikes, or heartbeats, a minute. Mrs. Wu’s heart was creating a painting that already had a title: atrial fibrillation.

“Okay, okay, give her the digoxin,” I sighed to Winnie. She smiled consolingly. I left the cardiac room to see other patients. Ten minutes later, she was tugging at my sleeve.

“She converted,” Winnie announced.

“Who?”

“Mrs. Wu.”

“Already?” Puzzled, I said, “Boy, that digoxin worked fast.”

Though I knew very well that it usually only slows the rate without making it stable.

“No,” Winnie insisted. “The magnesium.” Then she held up a syringe filled with a clear solution.

“Digoxin. I haven’t given it yet. It was the magnesium.”

“Whoa!” was the most intelligent comment I could produce.

We rushed back together. Mrs. Wu’s monitor beeped contentedly at a regular 84 beats a minute. Her daughter smiled at us and placed a hand over her own heart and said, “Much better. Not so fast now.”

“And how,” I thought. Now Mrs. Wu smiled and nodded quickly. A cure.

“I’ll be darned,” I said to Winnie.

At that moment, in a flash, as my brain shouted, “Eureka,” I heard the siren call of unscientific thinking. I had scooped even the cardiologists. I would try magnesium on all my A-fibbers from now on.

Later that day I hit the medical library. The largest study I could find on magnesium in new-onset atrial fibrillation included a paltry and utterly inconclusive 15 patients. Why hadn’t anyone studied it more definitively? Magnesium at my hospital costs a dollar a dose—no profit there—but I couldn’t blame the drug companies; doctors shouldn’t have to wait for drug companies to tell them which drugs to study. I polled more cardiologists.

They’d never heard of it being used for atrial fibrillation. I mentioned it to a colleague in Boston.

“Oh, we use it all the time,” he informed me with a shrug.

“Know of any good studies?” I asked.

“None,” he answered, just as casually.

“But it works.”

In short, Boston doctors treat atrial fibrillation, the most common arrhythmia, differently from their New York colleagues.

And no one had bothered to determine what works best.

Four days later Mr. Pak came in. He had been in trouble since the night before. Wizen and frail, he sat upright and restless in the bed. Every muscle in his neck stood out ropey and quivering from the strain of breathing. The rhythm on the monitor looked awful: rapid—180 beats a minute—and irregular.

The long irregular waves meant potential big trouble. And they had three possible causes. The first and most dangerous was ventricular tachycardia. This disordered contraction of the ventricles can cause blood pressure to plummet and frequently leads to ventricular fibrillation—a completely chaotic rhythm more crisply known as sudden death.

The second possibility was a “bypass tract,” an anomalous ribbon of heart tissue that can conduct some of the chaotic atrial impulses directly into the ventricles without passing through the atrioventricular node. The dicey part is that digoxin and diltiazem—standard treatment for atrial fibrillation—both accelerate conduction through the aberrant pathway, thus allowing atrial chaos to pass unhindered into the ventricles. This, too, can trigger ventricular fibrillation and sudden death.

The third option was plain atrial fibrillation (though a ventricular rate of 180 pretty much disqualified it as “plain”) with aberrant conduction through Mr. Pak’s aged Purkinje fibers.

While I stared at Mr. Pak’s monitor, Winnie hurriedly inserted two IV lines. Finally, I asked Rob, my second-year resident,

“Now what do we do?”

“Shock him?”

“Not a bad thought,” I agreed. A strong electric current delivered to the chest through metal paddles stills all unruly cells and allows the natural pacemaker to regain control. But the shock is painful. To mute the pain, we give sedatives, which can drop blood pressure or suppress breathing.

“What else?” I asked him.

“Call a doctor?”

We both laughed. Then I caught Winnie’s eye.

“Again?” her glance asked.

“Two grams this time. Over five minutes.”

The magnesium went in. We all stared at the monitor. For us, Mr.

Pak’s heart had become that luminous green tracing. Suddenly the rate seemed to ebb: 170 ... 165, and then poof! The wide sinus waves disappeared. With the slower rate, the Purkinje fibers had had time to reset and could conduct each beat with their usual blinding speed. In five more minutes, the rate came down to a

very gratifying 110. And Mr. Pak, even more gratified, could now breathe. Magnesium had quieted his atrial cacophony to a slow hum. The resident stepped back.

“Who was that masked man?” he whistled.

“Epsom salts,” I explained, “magnesium sulfate. I guess now we’re going to have to do that study after all—look at 50, 100 cases.”

Cardiologists have had access to magnesium chloride and sulfate for decades but only a few doctors understood what they had in their hands. With the publication of this medical review on magnesium there will be no more excuses for ignorance for the picture could not be any clearer. Magnesium has no equal in the prevention and treatment of a stroke or cardiac arrest. Magnesium chloride is the end of the rainbow in terms of cardiac care ; the only thing in doubt is how many years more will pass before the field of cardiology fully understands magnesium medicine.

All of the above explanations are polite compared to some of the other reasons why doctors do not use more magnesium. It’s hard to explain the full depth and breadth of the depravity of the pharmaceutical industry, the



medical research industry, and the federal government in a few words. I have written much about what I call pharmaceutical terrorism and outright medical insanity. I define medical insanity as the action of making the safest drugs illegal, or in the case of magnesium, setting aside the safest and most effective medicinal substances in favor of the most dangerous and ineffective ones. Medical marijuana is a case in point. It is a much safer and effective pain reliever than aspirin, which kills thousands of people a year.

I wrote a book called *The Terror of Pediatric Medicine* and it speaks out loud about the terrible depravity of the vaccine programs. We do not like to think that professional organizations can be at heart deliberately evil but if one believes evil does exist, it exists most strongly in the pharmaceutical and medical areas where the most people are harmed and killed. Money is not made keeping people well; it's made from allowing the public to get sick. Writing this book about magnesium and heart disease shocked me because the story is so completely clear when we look at the facts. I hope to shock the entire field of cardiology with this book but we can doubt if they will even pay attention, so deeply are modern professional minds conditioned in a negative way. But the truth is the truth and it stands against all attempts to diminish or hide it. For heart patients, magnesium is the truth that will make a difference between life and premature death, but that means very little to the people and organizations that rule over the medical industrial complex.

19 . Safer Surgery with Magnesium Before, During & After All patients were found to have low serum magnesium

levels postoperatively, but to a greater degree and 20

for a longer period following open-heart surgery. <sup>2177</sup>

Complications such as arrhythmias, kidney failure, stroke and infections may occur after heart surgery. Everyone scheduled for bypass or any type of surgery needs to increase their stores of magnesium. In the pre- and postoperative phases magnesium can help alleviate pain, decrease blood pressure, and alleviate certain heart arrhythmias; it works to prevent blood clotting, relieves depression so common after bypass surgery, and improves energy and cognitive abilities.

The level of serum magnesium during open-heart surgery showed a significant fall to below 20

normal values during the first postoperative day. <sup>2178</sup>

The high rate of hypomagnesemia after cardiac surgery is well 20

established. After heart surgery, mean magnesemia is reduced, <sup>2179</sup>

and the frequency of hypomagnesemia increases from 19.2 percent preoperatively to 71 percent immediately after surgery before dropping slightly to 65.6 percent 24 hours later.

The use of magnesium in the preoperative and early postoperative periods is highly effective in reducing the incidence 20

of atrial fibrillation after coronary artery bypass grafting. <sup>2270</sup>

Dr. Fevzi Toraman

The incidence of atrial fibrillation after coronary artery bypass surgery remains relatively high (26.83 percent). Lower serum magnesium levels have been found to be associated with an increased incidence of atrial fibrillation, which was decreased in several studies by the prophylactic administration of magnesium after coronary artery bypass grafting (CABG). In cardiac surgery, magnesium has proved to be as efficient as more toxic pharmaceutical drugs in controlling arterial pressure during cardiopulmonary bypass (CPB) procedures. <sup>221</sup>

While magnesium deficiency is fairly common, it is frequently overlooked as a source of problems. The reason is that serum magnesium levels (the test most doctors use) do not reflect body stores of magnesium. Blood levels are kept within the normal range at the expense of other tissues.

Various changes in magnesium can occur before, during and after surgery of any kind. Plasma concentrations are decreased after abdominal or orthopedic surgery. <sup>222</sup> Researchers at Duke University Medical Center,

Durham, USA reported that patients with low magnesium levels experienced a two-fold increase in

heart attacks and all-cause mortality rate as long as one year after surgery compared to those with normal magnesium levels .

When magnesium levels are corrected by the administration of magnesium before, during and after surgery, medical complications are significantly reduced to the point where it becomes simply imprudent to perform surgery without it. Dr. Minato at the Department of Thoracic and Cardiovascular Surgery in Japan strongly recommends the correction of hypomagnesemia during and after off-pump coronary artery bypass grafting (OPCAB) for the prevention of perioperative coronary artery spasm and his team has actually said that they won't perform this surgery without its use any longer . <sup>223</sup>

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Magnesium is depleted from the blood during CABG, <sup>2274</sup> and if extracorporeal circulation is used as part of the procedure, the depletion is even greater than if not used. Off-pump bypass surgery has now been shown to have a high incidence of post-surgical arterial spasm triggered by hypomagnesemia.

Postoperative incidence of hypomagnesemia was as high as 89

percent of patients (40 out of 45) in a recent study on the causes of post-surgical arterial spasm in Japan in 2005. When magnesium levels were corrected by the administration of magnesium both during and after surgery, no further coronary artery spasm occurred.

Potentially fatal blood clots after surgery are a much greater risk than has previously been thought, a British study finds.

“What is most striking is that not only is the risk higher, but that it lasts much longer than people have thought,” said Dr.

Jane Green, a clinical epidemiologist at the University of Oxford and a leader of the team reporting the findings in the online 20

edition of the British Medical Journal . <sup>2275</sup> Blood clots in the deep veins and the lungs, formally called venous thromboembolism, have long been known as a possible complication after any form of surgery. The risk of such a blood clot remained high for at least 12 weeks after surgery, the study found.

Magnesium has an effective antithrombotic activity in vivo, and treatment with magnesium may lower 20

the risk of thromboembolic-related disorders. <sup>2276</sup>

“It is the surgeon’s primary responsibility to make sure not only that the surgery is effective, but also that the complication rate of surgery is minimized as much as possible,” instructs Dr.

Alexander Cohen, an honorary consultant vascular physician at King’s College Hospital in London.

Magnesium has an important role to play in preventing blood clots and keeping the blood thin—

much like aspirin but without the side effects.

Dr. Carolyn Dean

Author, The Miracle of Magnesium

Dr. Sarah Myhill says, “Magnesium deficiency also predisposes to an increased clotting tendency in the blood and to an increased vulnerability of the arterial wall to damage from other factors such as have been discussed elsewhere in this paper. These tendencies diminish with magnesium supplementation. Clotting is of course the central event in the formation of coronary thrombosis. The buildup of homocysteine levels discussed earlier is due mostly to the vitamin B6, B12, and folic acid deficiencies, but also partly due to magnesium deficiency.”

Magnesium prevents blood clots and thins the blood without side effects.

Dr. Myhill continues saying, “Magnesium has both a thrombolytic (able to dissolve thrombosis) effect and the ability to protect against adverse effects of stunning. From the mid 1980s there has been increasing evidence that the use of intravenous magnesium, given as early as possible (and before reperfusion), has a major beneficial effect on the outcome of this life-threatening situation. Positive studies have shown improved survival rate of between 50 and 82.5 percent after doses of intravenous magnesium given by drips in the dosage range of 32-66 mmol in the first 24

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hours.” <sup>2277</sup>

We recommend routine measurement of magnesium levels after CPB in pediatric patients undergoing heart surgery, with 20

timely magnesium supplementation in the postoperative period. <sup>2278</sup>

Dr. B. Hugh Dorman, et al.

Magnesium depletion found to occur commonly after cardiac surgery in children and adults was shown to cause significant neurological and cardiac symptoms. Studies demonstrated an almost universal occurrence of magnesium depletion during and after cardiac surgery , and also demonstrated that supplementation may 20

be preventive. <sup>2279</sup>

Maintenance of magnesium levels within the normal reference range in the immediate postoperative period of heart surgery decreased junctional ectopic tachycardia. Plasma depletion and total body magnesium depletion also occur in pediatric patients after heart surgery and may be more pronounced than in adults because the volume of prime for CPB is large compared with blood volume, and preoperative magnesium levels may be below normal, especially in 20

critically ill neonates. <sup>2370</sup>

Magnesium administration is safe and improves

short-term postoperative neurologic function after cardiac surgery, particularly in preserving short-term memory and cortical control over brainstem functions.

Dr. Sunil K. Bhudia <sup>231</sup>

Ways of decreasing post-operative analgesic drug requirements are of special interest after major surgery. Magnesium alters pain processing and reduces the induction and maintenance of central sensitization by blocking the N-methyl-d-aspartate (NMDA) receptor in the spinal cord. In patients undergoing orthopedic surgery, supplementation of spinal anesthesia with combined intrathecal and epidural magnesium significantly reduces patients' postoperative analgesic requirements . <sup>232</sup>

Magnesium infusion during general

anaesthesia reduces anaesthetic consumption and analgesic requirements. <sup>233</sup>

Magnesium administration at the time of the induction of anesthesia improves hemodynamics in patients with CAD undergoing coronary artery bypass grafting (CABG) and is associated with lesser hemodynamic and ST segment changes compared with lidocaine 20

at the time of endotracheal intubation in these patients. <sup>2374</sup>

Magnesium sulfate is used intravenously to prevent hypertensive 20

crises or seizures associated with toxemia of pregnancy. <sup>2375</sup>

A high rate of postoperative hypomagnesemia has also been observed in pediatric heart surgery. Junctional ectopic tachycardia occurred in 27 percent of children who were not given magnesium postoperatively, whereas those who received magnesium 20

had no rhythm disorders. <sup>2376</sup>

Stress from surgery has contributed toward increasing the clinical importance of detecting and correcting blood levels of magnesium. Orders for serum magnesium testing at our hospital have had astounding increases over the last 20-25 years with more than 125,000 total magnesium measurements ordered in 2005. The frequency of hypomagnesemia in critical care settings is well 20

noted. <sup>2377</sup>

In another study, a group of 40 men were divided into two groups and half were given preoperative oral magnesium supplementation, the other half were not. Measurements of magnesium, epinephrine, and norepinephrine were taken before, during, and after surgery.

The findings were that magnesium levels dropped and epinephrine and norepinephrine levels elevated as a result of surgery in both groups, but to a significantly greater extent in the group that did not receive the supplements. They concluded that magnesium

supplementation prior to surgery substantially reduces intra- and 20

postoperative disorders. <sup>2378</sup>

Personally I have just had two cataract operations and I used magnesium chloride eye drops that I made up myself using a pure magnesium oil diluted 15 parts mineral water to one part magnesium. The surgery was a success and my recovery was quick.

This same magnesium can be put in a nebulizer and can be used at home by patients both before and after surgery both orally and transdermally to great effect. Surgeons need to become familiar with the transdermal approach for then they can start their patients off with heavy application weeks before surgery and for weeks after since this method of application can easily be done at home by the patients.

It behooves everyone scheduled for surgery to increase their stores of magnesium through supplementation including using magnesium oil in baths, footbaths, or as a body spray.

Doctors who know what they are doing will not perform surgery without using magnesium, for to do so involves increasing risks and unnecessary complications.

## 1. Blood-Brain Barrier &

### Magnesium in Alzheimer's

The integrity and function of the blood-brain barrier (BBB) is mission critical for overall brain function. Changes in permeability often reflect alterations in blood-brain barrier transport systems. Toxicological causes of generalized changes in blood-brain barrier permeability include organic solvents, enzymes, and heavy metals. Some agents like mercury induce selective changes in BBB transport at very low doses.

Blood-brain barrier integrity is

compromised by free radicals.

Magnesium has been seen to attenuate increased blood-brain barrier permeability during insulin-induced hypoglycemia in animal studies. Magnesium has its important role at the BBB and researchers think that this metal protects brain tissue against the effects of cerebral ischemia, brain injury, and stroke through its actions as a calcium antagonist and inhibitor of excitatory amino acids.

When the magnesium level is low, the

glutamate receptors become hypersensitive.

Dr. Russell Blaylock

Magnesium is essential in regulating central nervous system excitability, thus magnesium-deficiency may cause aggressive



behavior, <sup>2379</sup> depression, or suicide. <sup>274 70</sup> Magnesium calms the brain and people do not need to become severely deficient in 20

magnesium for the brain to become hyperactive. One study <sup>274</sup><sup>1</sup>

confirmed earlier reports that a marginal magnesium intake overexcites the brain's neurons and results in less coherence, creating cacophony rather than symphony, according to 20

electroencephalogram (EEG) measurements. <sup>274</sup><sup>2</sup>

Communication between cells in the brain depends on specialized molecular receptors that conduct charged particles, or ions, between the outside and inside of cells.

Dr. Jon W. Johnson

Memory and the overall functioning of our minds and brains happens to depend on proteins in our brains called NMDA (N-methyl-d-aspartate) receptors, which allow our neurons to communicate with each other. Dr. Jon W. Johnson, University of Pittsburgh associate professor of neuroscience, has discovered how different types of NMDA receptors perform varied functions.

His findings are published in the current issue of the Journal of Neuroscience in a paper titled "Permeant Ion Effects on External Mg<sup>2+</sup> Block of NR1/2D NMDA Receptors." An understanding of the strategic importance of magnesium at these crucial NMDA receptor sites confirms the medical view that heavy magnesium supplementation would lead to better treatments for schizophrenia, Alzheimer's disease, and stroke.

Magnesium depletion, particularly in the hippocampus, appears to represent an important pathogenic factor in Alzheimer's disease. It is associated with high aluminum incorporation into brain neurons.

Dr. Jean Durlach

Dr. Jean Durlach, of Hôpital Saint-Vincent-de-Paul in France, recognized 15 years ago the importance of magnesium in the 20

development of Alzheimer's <sup>274</sup>3 saying, "Among the recent studies concerning the difficult problem of the pathogenesis of Alzheimer's disease, numerous studies have revealed the increased presence of aluminum (Al) in brain tissue obtained from autopsies of Alzheimer's disease patients. However, while Perl et al.

stressed the significance of their findings concerning Al in hippocampal tissue, they ignored practically any discussion of their findings concerning magnesium.

Mg values are found to be significantly decreased in brain 20 20

regions of diseased patients compared to the controls. <sup>274</sup> 74

Dr. E. Andrasi Institute of Inorganic and Analytical

Chemistry

In 1990 Dr. J.L. Glick showed a significant decrease in the frequency of intracellular magnesium deposits in neurons of Alzheimer's disease patients as compared with control patients.

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<sup>274</sup> 75 Dr. Glick suggests that Alzheimer's disease involves a defective transport process characterized by both an abnormally low Mg incorporation and an abnormally high Al incorporation into brain neurons. The origin of this disturbance rests on an alteration of serum albumin, forming a species that has a greater affinity for Al than for Mg, in contrast to the normal protein that binds Mg better than Al.

Magnesium infusion reduces the need for other drugs to control muscle spasms and cardiovascular 20 20

instability in adults with severe tetanus. <sup>274</sup> 76

## 1. Multiple Sclerosis —The Magnesium, Selenium, Iodine, & Mercury Connection

There is no disputing the fact that modern pharmaceutical medicine has neither solved nor cured any of the modern chronic disease plagues that are morphing out of control into pandemics.

What is going on in the areas of cancer, diabetes, heart disease, strokes, and neurological disease is painting a horrific image of the failure of contemporary medicine, which seems unable to learn anything about what will make a difference for their patients.

They are good to go with words of promise but they don't deliver, and things are only getting worse in terms of public health.

It is difficult to treat any disease today without paying attention to the profound magnesium deficiencies that exist in nearly 100 percent of sufferers of chronic disease. We could easily say the same for bicarbonate and iodine, and when we pay attention to all three at the same time our work in helping people recover from their suffering and pain is greatly eased.

This is especially true when it comes to neurological diseases.

The central nervous system is extremely sensitive and reacts to a combination of factors that allopathic doctors don't normally touch down on. Toxic exposures, nutritional deficiencies, and emotional anguish converge most pointedly on the nervous system, often with catastrophic results. As we will see below one of the main disasters facing people today are wide ranging exposure to both mercury and aluminum—metals at the top of the list for causing neurological damage.

Toxic substances such as mercury, which the body is chronically exposed to, accumulate in the brain, pituitary gland, CNS, liver,

kidneys, etc. and can damage, inhibit, and cause imbalances at very low levels of exposure. Heavy metals can cause major neurological, immunological, and metabolic damage.

Each individual will be seen to have their own unique combination of neurological, endocrine, and enzymatic imbalances along with autoimmunities that result from the above factors. Symptoms will vary resulting in different differential diagnoses: multiple sclerosis (MS), amyotrophic lateral sclerosis (ALS), Alzheimer's disease (AD), Parkinson's disease (PD), systemic lupus erythematosus (SLE), rheumatoid arthritis (RA), or chronic fatigue syndrome (CFS).

Multiple sclerosis is difficult to address because the symptoms are so variable and treatments are often ineffective. This disease affects the central nervous system by damaging the myelin sheaths surrounding nerves of the brain and spinal cord.

Primarily affecting teenagers and young adults of Northern European descent, the disorder begins between ages 10 and 50 in almost all affected individuals. About 400,000 people in the United States have MS—twice as many women as men.

Although the cause remains officially unknown, it is widely thought to begin as an autoimmune inflammation with magnesium deficiency at the core. In studies it has been shown that there was a significantly lower value of magnesium than that seen in control cases. The most marked reduction of magnesium content was observed in CNS white matter including demyelinated plaques of MS

20 20

samples.<sup>274 77</sup>

Magnesium is central to immunocompetence and 20 20

plays a crucial role in natural and adaptive immunity.<sup>274 78</sup>

Magnesium protects the cells from aluminum, mercury, lead, cadmium, beryllium, and nickel. Evidence is mounting that low levels of magnesium contribute to the heavy metal deposition in the brain that precedes Parkinson's, multiple sclerosis, and Alzheimer's. Research has shown that the symptoms of MS are very 20 20

similar to mercury poisoning.<sup>274 79</sup> Mercury is a primary cause of inflammation in our bodies.

The rate of relapse in multiple sclerosis was found to be 20 20

decreased with dietary magnesium supplementation.<sup>275 70</sup>

MS sufferers have a wide variety of symptoms that often begin rather abruptly and proceed at a highly variable and unpredictable pace. Common early symptoms include numbness, pins-and-needles sensations, diminished coordination, weakness especially in the legs, painful loss of vision in one eye, double vision, dizziness, pain at various sites, urinary symptoms, and impotence. Symptoms of MS that are also symptoms of magnesium deficiency include muscle spasms, weakness, twitching, muscle

atrophy, an inability to control the bladder, nystagmus (rapid eye movements), hearing loss, and osteoporosis.

What is essential to remember about treating pain with magnesium is that it treats both the symptom and the cause of pain—meaning the cause of the pain can often be traced back to a magnesium deficiency.

Researchers have found oral magnesium therapy effective on patients with multiple sclerosis. In one formally reported case a 35-year-old woman suffered with severe spastic paraplegia resulting from multiple sclerosis (MS). A significant improvement in the spasticity was found after only one week from the onset of the treatment on the modified Ashworth scale, an improvement in the range of motion and in the measures of angles at resting 20

position in lower limbs.<sup>275<sup>1</sup></sup>

Nystagmus is characterized by an involuntary movement of the eyes, often noted as a shaky or wiggly movement and has been directly tied to magnesium deficiencies. People with MS also have higher rates of epilepsy than controls. Epilepsy has also been linked to magnesium deficiencies. Without doubt magnesium supplementation accompanied by pH control via diet and the use of sodium bicarbonate will do wonders for not only

multiple sclerosis patients but also Alzheimer's and Parkinson's disease sufferers.

## Iodine

The relatively low prevalence of multiple sclerosis in Japan, despite its temperate latitude, has puzzled many researchers. We know though that their soils have some of the world's highest known levels of iodine caused by the use of seaweed as a fertilizer. Deficiencies of this essential trace element appear to be associated with many diseases, or birth defects, including goiter, cretinism, multiple sclerosis, amyotrophic lateral sclerosis, and cancer of the thyroid and nervous system. Although the evidence is weaker, iodine deficiency may also be implicated in Alzheimer's and Parkinson's diseases. It should be obvious to physicians that mineral deficiencies are at the center of chronic diseases, which can be largely avoided if appropriate replenishment is stressed.

People with MS may also have low levels of selenium or of glutathione peroxidase, an enzyme produced from selenium. A theory explaining the pathogenesis of MS refers to an increased stickiness of cellular plasma membranes, hampering normal vascular function of the brain. In agreement with that theory, researchers have found significantly lowered selenium values and 20

lowered glutathione peroxidase activities. <sup>2752</sup>

**MS & Mercury Exposure** Dental amalgam is documented by medical studies and medical lab tests to be the largest source of both inorganic and methyl mercury in most people who have several mercury amalgam fillings.

Very low levels of exposure have been found to seriously affect individuals who are immune sensitive to toxic metals or have an inability to detoxify metals due to deficient sulfoxidation or metallothionein function or other inhibited enzymatic processes related to detoxification or excretion of metals.

Amalgam exposures are commonly above government health guidelines. This is due to continuous vaporization of mercury from amalgam in the

mouth, along with galvanic currents from mixed metals in the mouth that deposit the mercury in the gums and oral cavity. Mercury is one of the most toxic substances in existence and is known to bioaccumulate in the bodies of people and animals that have chronic exposure.

A large epidemiological study of 35,000 Americans by the National Institute of Health, the nation's principal health statistics agency, found that there was a significant correlation between having a greater than average number of dental amalgam surfaces and having chronic conditions such as epilepsy, MS, or migraine headaches. MS clusters in areas with high metals emissions from facilities such as metal smelters have been documented.

Mercury has been found to accumulate preferentially in the brain, major organs, hormone glands, and primary motor-function-related areas involved in ALS, such as the brain stem, cerebellum, rhombencephalon, dorsal root ganglia, and anterior horn motor neurons, which enervate the skeletal muscles.

Mercury and magnesium deficiencies are at the root of inflammation so it is important to understand that chelation of mercury will relieve many of the problems caused by it and that magnesium will protect our cells from the inflammation that mercury causes. Magnesium is a necessary factor in chelation, for 20

without it chelation will not be successful. <sup>2753</sup> Heavy metals like cadmium, lead, and mercury compete with nutritional magnesium, keeping it from availability to protect our cells. The healthy cell wall favors intake of nutrients and elimination of waste products and this is one of the reasons magnesium is so important in detoxification and chelation.

Magnesium is a crucial factor in the natural self-cleansing and detoxification responses of the body.

MS Seen Through a Vascular Surgeon's Eyes Dr. Paolo Zamboni, a former vascular surgeon and professor at the University of Ferrara in northern Italy, has come upon an entirely new idea about what causes MS and how to treat it. He

found that scientists who had studied the brains of MS patients had noticed higher levels of iron in their brain, not accounted for by age. The iron deposits had a unique pattern, often forming in the core of the brain, clustered around the veins that normally drain blood from the head. No one had ever fully explained this phenomenon, considering the excess iron a toxic byproduct of the MS itself.

Using Doppler ultrasound, Dr. Zamboni began examining the necks of MS patients and found that almost 100 percent of the patients had a narrowing, twisting, or outright blockage of the veins that are supposed to flush blood from the brain. He then checked these veins in healthy people and found none of these malformations.

Nor did he find these blockages in those with other neurological conditions.

What was astounding was that not only was the blood not flowing out of the brain, it was “refluxing”—reversing and flowing back upwards. Zamboni dubbed the vein disorder he discovered CCSVI, or chronic cerebrospinal venous insufficiency, and began publishing his preliminary research in neurology journals. He soon found that the severity of the vein blockages corresponded to the severity of the patient’s symptoms. Patients with only one vein blocked usually had milder forms of the disease; those with two or more damaged veins had more severe illness.

If key veins of MS patients are blocked, perhaps we can open them and restore normal blood flow? Yes, doctors use balloons to open up blocked arteries that feed blood from the heart but there are many natural treatments that can help, like using niacin and different enzymes as well as removing the heavy metal buildups with chelation.

## 22 . Magnesium & Endocrine Function

### Menopause & Premenstrual Syndrome

Every day the same type of conversation takes place between women going through menopause and their doctors. Afterwards doctors usually write out prescriptions for estrogen pills or patches, saying they will replace the hormones that a woman’s body ought to be making. The doctor promises



these medicines will cure her hot flashes, slow her bone loss, and reduce her risk of a heart attack. Unfortunately we find out: The risk of having a blood clot was close to 30 percent 20 20

more for a woman on estrogen vs. not on estrogen. <sup>275</sup> 74

Dr. J. David Curb

Estrogen therapy appears to increase the risk of blood clots in the veins of postmenopausal women who have had their uterus removed. These latest results from the Women's Health Initiative

(WHI) were unexpected, even to the study's lead author. "It surprised us all how few benefits have come out of this and how many negatives," said Dr. J. David Curb, a professor of geriatric medicine at the University of Hawaii. The study appeared in the April 10, 2006 issue of the Archives of Internal Medicine .

These same women ask if the pills cause cancer. The doctor acknowledges that there is an increased risk of uterine and breast cancer, but argues that the benefits to the heart and bones are worth taking the chance. Of course there is concern about other risks from these medications like strokes and water retention, among others.

Like animals lured into a snare by a trail of crumbs, women have been cajoled with scientific studies, media advertising, patient handbooks, and drug samples to accept hormone replacement therapy as a magic potion.

Sherill Sellman

Hormone replacement therapy (HRT) does not do justice to the 20 20

finely tuned hormone system <sup>275</sup> 75 that operates throughout a woman's life. In reality, hormone levels may begin to change for a woman in her 30s as she enters a period called perimenopause.

In the decades leading up to menopause, small hormonal imbalances can exist, so by the time menopause sets in, a woman may have already

experienced close to 20 years of hormonal imbalance.

Hormone replacement actually can cause the body to slow down the production of its own natural hormones, including melatonin, DHEA, progesterone and human growth hormone. HRT does not treat the cause of any problem, it only addresses—and perpetuates—the symptoms. Adding hormones artificially is a form of medical roulette because you never really know how the finely balanced hormonal system will respond.

My MD put me on hormone therapy, a combination of estrogen and progestin, and the effects on me were profound. Within the first month my feet and legs swelled up all the way to my knees. I could not get shoes on (but the hot flashes were gone), and when I stopped the hormones, it took almost a full month for the swelling to dissipate and my feet and legs to get back to normal.

I experienced breakthrough bleeding, which I was told might occur, but everyday?

Claudia French RN, LPHA

In addition to the risk of disease, the side effects associated with HRT include mood changes, nausea, breakthrough vaginal bleeding and bloating, breast tenderness, concerns about breast 20 20

20 20

20 20

<sup>275</sup> 76 , <sup>275</sup> 77 and ovarian cancer, <sup>275</sup> 78 gallbladder disease, and

thromboembolic events. Strong Medline warnings for estrogen now state: “Estrogen increases the risk that you will develop endometrial cancer (cancer of the lining of the uterus). The longer you take estrogen, the greater the risk that you will develop endometrial cancer. If you have not had a hysterectomy (surgery to remove the uterus), you might have been given another medication called a progestin to take with estrogen. This may

decrease your risk of developing endometrial cancer, but may increase your risk of developing certain other health problems, 20 20

including breast cancer.” 275 79

Concerns about safety and effectiveness are causing a retreat from the blanket use of HRT. An estimated 30-45 percent of women who receive prescriptions for HRT will not have their prescriptions filled or will discontinue therapy within 12 months 20 20

of initiation. 276 70

**Crucial Link Between Cholesterol, Magnesium & Hormones** It is impossible to consider estrogen and progesterone in isolation from other hormones and from precursors like cholesterol and magnesium. All steroid hormones are created from cholesterol in a hormonal cascade. Cholesterol, that most-maligned compound, is actually crucial for health and is the mother of hormones from the adrenal cortex, including cortisone, hydrocortisone, aldosterone, and DHEA. One of the most basic hormones and the first in the cascade is pregnenolone, which is converted into other hormones, including dehydroepiandrosterone (DHEA), progesterone, testosterone, and the various forms of estrogen. These hormones are interrelated, each performing a unique biological function.

DHEA is a steroid hormone produced by the adrenal gland and ovaries and converted to testosterone and estrogen. After being secreted by the adrenal glands, it circulates in the bloodstream as DHEA-sulfate (DHEAS) and is converted as needed into other hormones . Estrogens are also steroids.

Cholesterol cannot be synthesized without magnesium and cholesterol is a vital component of hormones. Aldosterone is one such hormone and it helps to control the balance of magnesium and other minerals in the body. Interestingly aldosterone needs magnesium to be produced and it also regulates magnesium's 20

balance. 276<sup>1</sup> Women who suffer from premature menopause, or an early failure of the ovaries, report that magnesium often helps fight the crashing fatigue that often comes at the beginning of 20

premature or early menopause by boosting energy levels. <sup>2762</sup>

The role that magnesium plays in the transmission of hormones (such as insulin, thyroid, estrogen, testosterone, DHEA, etc.), neurotransmitters (such as dopamine, catecholamines, serotonin, GABA, etc.), and mineral electrolytes is a strong one. Research concludes that it is magnesium status that controls cell membrane

potential and through this means controls uptake and release of many hormones, nutrients and neurotransmitters.

“Magnesium,” says Dr. Lewis B. Barnett, “is needed by the pituitary gland. The pituitary, sometimes called the miracle gland, takes instructions from the hypothalamus in the brain to which it is connected by a thin stalk, then transmits them through the body in the form of chemical messengers known as hormones. These hormones not only exert a direct influence of their own, but also trigger the production of other vital hormones elsewhere in the body. When the pituitary is not getting the magnesium it needs, it fails in its function of exercising a sort of thermostatic control over the adrenals, which are thus allowed to overproduce adrenaline.”

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During perimenopause, <sup>2763</sup> there are wide fluctuations in the hormones estrogen, testosterone, FSH, LH, and progesterone, and it is these widely fluctuating hormone levels that can cause many problems, the least of which is hot flashes.

Estrogens are primarily responsible for the conversion of girls into sexually mature women in the development of breasts, the further development of the uterus and vagina, broadening of the pelvis, growth of pubic and axillary hair, and they play a role in the increase in adipose (fat) tissue. They also participate in the monthly preparation of the body for a possible pregnancy and participate in pregnancy if it occurs. Estrogen is not one hormone, but many, and our bodies continue to make estrogens all of our lives. The adrenals, the fat tissues, and perhaps the uterus make estrogens.

Menopause is brought on by the natural decrease in the body's production of estrogen and progesterone.

Estrogen causes a higher absorption and use of magnesium and zinc. Estrogen is normally associated with pregnancy. During pregnancy the body needs more minerals and estrogen takes care of the higher absorption. The estrogen enables a female to get just enough magnesium out of a low-magnesium diet. When the estrogen levels drop, the magnesium absorption drops and hypomagnesemia (magnesium deficiency) is the result. This can then cause severe depression or diabetes or hypoglycemia or many other problems as 20 20

both estrogen and magnesium levels drop through the years. <sup>276</sup> 74

The use of contraceptives and estrogen replacement 20 20

therapies cause magnesium deficiencies. <sup>276</sup> 75

When you realize that more than 300 types of tissues throughout the body have receptors for estrogen—which is to say that they're affected in some way by the hormone—it's not surprising that its

decrease would cause physical changes. Estrogen affects the genital organs (vagina, vulva, and uterus), the urinary organs (bladder and urethra), breasts, skin, hair, mucous membranes, bones, heart, blood vessels, pelvic muscles, and the brain. It's the loss of estrogen to these organs that causes the ultimate changes of menopause, including dry skin and hair, incontinence, and susceptibility to urinary tract infections, vaginal dryness, and most importantly, osteoporosis and heart disease. These diseases are at the center of the controversy concerning menopause: Because estrogen plays a role in preventing these diseases, should you replace the estrogen lost at the time of menopause with a synthetic version?

Estrogens also have non-reproductive effects. They antagonize the effects of the, parathyroid hormone, minimizing the loss of 20 20

calcium from bones, and they promote blood clotting. <sup>276</sup> 76 There are several forms of estrogen but the one most important for reproduction is

estradiol, a substance secreted by the ovary. In addition to being responsible for the development of sexual characteristics in women, estrogen governs the monthly thickening of the endometrium and the quantity and quality of cervical and vaginal mucus so important to the successful passage of the sperm.

Magnesium is supercritical to endocrine function. Gonadotropin-releasing hormone (GnRH) is a master hormone from the hypothalamus in the brain. It sparks the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland, which in turn prompts production of estrogen and progesterone in the ovaries. Magnesium is involved in melatonin production and the circadian clocks in the human body. In particular, a deficiency of magnesium can impair the 20 20

suprachiasmatic nucleus of the hypothalamus.<sup>276 77</sup> And balanced magnesium status is required to obtain efficiency of 20 20

suprachiasmatic nuclei and the pineal gland.<sup>276 78</sup> Examinations of the sleep electroencephalogram (EEG) and the endocrine system point to the involvement of the limbic-hypothalamus-pituitary-adrenocortical axis because magnesium affects all elements of this system. Magnesium has the property to reduce the release of adrenocorticotrophic hormone (ACTH) and to affect adrenocortical sensitivity to ACTH.

Hormone replacement therapy (HRT) is based on the incorrect assumption that your body becomes incapable of producing appropriate amounts of hormones simply because we reach a certain age. Your body does alter its hormone production as you pass through the stages of your life, but hormone problems are a function of how healthy you are, not how old you are.

Theresa Dale, ND

In today's age, with a staggering 68 percent of Americans not consuming the recommended daily intake of magnesium and more than 19 percent of Americans not consuming even half of the government's recommended daily intake of magnesium, we can easily see that magnesium impacts these

life changes and the accompanying discomforts, and it can often reduce the problems and long-term risks that occur.

Prior to menopause, estrogen plays a protective role in relation to heart disease, but as estrogen production diminishes, the risk of heart disease increases. Ten years after menopause, a woman

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has nearly the same risk as a man of dying of heart disease. <sup>276 79</sup>

Renowned magnesium researcher, Dr. Mildred Seelig, points out that although there is no uniform agreement that estrogens lower serum magnesium levels, most of the evidence points in that direction . It is also possible that the paradoxical effects of estrogen on diseases of the cardiovascular system relate partially to its effects on magnesium distribution. It has been shown that serum magnesium falls with the cyclic increase in estrogen secretion. Since rats given estrogen showed decreased serum magnesium levels without increased urinary magnesium output, and since the bone-magnesium increased, Goldsmith and Baumberger (1967) proposed that a shift of magnesium to the tissues was responsible for the estrogen-induced fall in serum magnesium. The role that magnesium plays in the transmission of hormones (such as insulin, thyroid, estrogen, testosterone, DHEA, etc.), neurotransmitters (such as dopamine, catecholamines, serotonin, GABA, etc.), minerals, and mineral electrolytes is crucial.

The symptoms occurring during perimenopause can be severe and may correlate with naturally decreasing levels of DHEA, which hit peak levels around the age of 20 and then decrease as we age.

Since DHEA is one of the primary biomarkers for aging, the long-range effect of large doses of magnesium in a usable form is to significantly raise DHEA levels and thus produce true age reversal results. Dr. Norman Shealy, who is an expert on antiaging and has done studies regarding magnesium and aging, refers to DHEA as the “master hormone”. He states that when produced at sufficient levels, DHEA will induce the production of all of the other hormones whose depletion can be associated with many

symptoms of aging. He found that through the transdermal use of magnesium oil, women have reported complete abatement of menopausal symptoms and some have even returned to their

menstrual cycle. This effect was found only when magnesium is applied through the skin and not with oral products.

One of the major sexual impacts of decreased estrogen is a shrinking of the vagina and thinning of the vaginal walls, along with a loss of elasticity and decreased vaginal lubrication during sexual arousal. Some women experience only slight changes in sexual functioning, while others have dryness and pain with intercourse, or genital soreness for a few days after sexual activity if they don't use a vaginal lubricant or take some form of hormone replacement. We have reports from some women using magnesium oil that when sprayed in the vaginal area, vaginal dryness is decreased and sexual arousal is increased. Dr. Shealy confirms these findings from his clinical experience.

Premenstrual syndrome (PMS) is characterized by physical and emotional symptoms that develop following ovulation and decrease with the beginning of menstruation. These recurrent symptoms typically include anxiety, depression, irritability, fatigue, abdominal bloating, fluid retention in fingers and ankles, breast tenderness, altered sex drive, headache, and food cravings. The combination and severity of symptoms vary among women. The Office of Women's Health within the Department of Health and Human Services reports that as many as 75 percent of women experience some symptoms of premenstrual syndrome. This correlates quite closely with MIT's estimate that 67 percent of the population is deficient in magnesium.

Natural supplementation with magnesium is highly preferred over use of DHEA creams with their many precautions and can relieve many of these troublesome problems.

The importance of balancing calcium with magnesium is noted by Dr. Christianne Northrup, who recommends a ratio of 1:1 between 20 20



calcium and magnesium for PMS symptoms. <sup>277</sup> 70 Magnesium supplementation has been shown in double-blind trials to be effective in relieving premenstrual symptoms. Dr. Melvyn R.

Werbach believes that even though many nutrients are implicated in the development of PMS, the borderline magnesium levels seen 20

in PMS patients can explain most of the symptoms. <sup>277</sup><sup>1</sup> He notes that marginal deficiency of magnesium can deplete brain dopamine, impair estrogen metabolism, increase insulin secretion, and cause enlargement of the adrenal cortex (responsible for producing many hormones including sex hormones, stress hormones, and blood-sugar hormones).

“I think magnesium is the underrated all-star in terms of menopausal women,” says Ann Louise Gittleman, PhD, pointing out it is not only good for bones, but it also helps prevent heart disease and can keep you calm and help you sleep throughout the night. She recommends all women going through menopause take 20

magnesium supplements along with flaxseed. <sup>277</sup><sup>2</sup> Up to 80 percent

of American women experience hot flashes during menopause while only 10 percent of Japanese women experience that symptom. Some researchers speculate that these differences may be due to differences in diet, lifestyle, and/or cultural attitudes toward 20

aging. <sup>277</sup><sup>3</sup> But these suggested differences are vague and global in scope. In all likelihood the big difference is magnesium.

Japanese women consume a large amount of sea vegetables of one kind or another all of which are extraordinarily high in magnesium.

Magnesium plays a critical role in a wide range of essential activities including many functions relevant to premenstrual changes experienced by some women. Magnesium is classed as

“nature’s tranquillizer” and so is vital in those aspects of the pre-menstrual symptoms that relate to anxiety, tension, etc.

Women with PMS have been found to have lower levels of red blood cell magnesium than women who don't have symptoms, and the supplementation of magnesium has been found to be extremely useful in alleviating many of the PMS symptoms and even more effective when taken with vitamin B6 at the same time. A magnesium deficiency can cause blood vessels to go into spasms so if you suffer from menstrual migraines, magnesium can be useful in preventing these spasms.

Magnesium is necessary for serotonin synthesis, which in turn is critical in mood regulation. Magnesium also appears to promote proper fluid balance, helping to ease the uncomfortable buildup of excess fluid experienced by some women prior to menstruation.

Inadequate magnesium levels have been found in women who experience premenstrual cravings and appetite changes.

A woman's menopause should not be seen as a pathologic endocrine deficiency disease because female hormones normally abate with advancing age as reproductive function comes to a halt. How and why this happens is a relative mystery to mainstream medicine, but we can easily see how certain conditions will hasten and deepen the decline of the key hormones involved.

It is clear that living without the protective effects of estrogen increases a woman's risk for developing serious medical conditions, including osteoporosis and cardiovascular disease.

Women have every reason in the world to start supplementing their diets with large amounts of magnesium early in life, especially with magnesium chloride when applied transdermally. Though no one knows exactly why that form alone seems to provoke increases in DHEA levels, it probably has something to do with the penetration of the magnesium through the fat tissues.

Women should pay particular attention to adequate intakes of magnesium starting early on and supplement as necessary to assure adequate DHEA levels and better-balanced hormone levels. Because women's issues are centered on hormonal balances, it is vital to understand that the only way

discovered so far to raise DHEA levels naturally is through transdermal application of magnesium

chloride. Though magnesium chloride can be purchased in many pharmacies, I highly recommend people experience a naturally-made magnesium chloride that is a byproduct of salt production. Below are some briefs on specific conditions related to menopause or menstruation where magnesium is shown to be of significant help.

### Menstrual Migraine

Low magnesium levels may be a trigger for menstrual migraine.

Mauskop et al. reported a deficiency in ionized magnesium in 45

percent of attacks of menstrual migraine, while only 15 percent of non-menstrually-related attacks had a deficiency. They also demonstrated that attacks associated with low ionized magnesium could be aborted by intravenous magnesium infusions. Facchinetti et al. demonstrated that menstrual migraine could be prevented by administration of oral magnesium during the last 15 days of the menstrual cycle.

Menopause, Mood Disorders, & Magnesium Perimenopause and menopause related mood disorders cause significant distress to a large number of women. In the United States, one half of perimenopausal women will report feeling 20 20

irritated or depressed.<sup>277</sup> 74 Different studies have shown that a woman's risk for a first bout with depression rises sharply as she approaches menopause. "There is a subgroup of women who, for multiple reasons, may be more vulnerable," said Dr. Lee Cohen of Harvard Medical School, which followed 460 Boston-area women for 20 20

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six years.<sup>277 75</sup> Several studies<sup>277 76</sup> ,<sup>277 77</sup> show without doubt that there is a definite relation between magnesium deficiency and depression, and that increasing our intake of magnesium can bring relief.

## Osteoporosis

Each year over 300,000 women suffer a hip fracture brought on by osteoporosis. Within a year, one in five will die.

Magnesium plays a significant role in preventing osteoporosis in the postmenopausal period. Studies have shown that magnesium<sup>20 20</sup>

improves bone mineral density.<sup>277 78</sup> Without adequate magnesium,<sup>20 20</sup>

calcium cannot enter the bones.<sup>277 79</sup> Heavy metal exposure affects bone density. Although women with menopause may suffer from osteoporosis due to estrogen deficiency, bone fragility increases with increasing magnesium deficiency. High calcium intake is recommended for women with menopause, but adequate magnesium intake is necessary to lower dietary Ca/Mg ratio, because the high ratio prompts blood coagulation. A group of menopausal women were given magnesium hydroxide to assess the effects of magnesium on bone density. At the end of the two-year study, magnesium therapy appeared to have prevented fractures and resulted in a<sup>20 20</sup>

significant increase in bone density.<sup>278 70</sup> The relationship

between calcium and magnesium is dealt with extensively in the chapter on “Calcium & Magnesium.”

## Magnesium & Hot Flashes

Many menopausal women suffer from heart palpitations associated with hot flashes. These can be alleviated by increasing your intake of magnesium. Magnesium plays a significant role in body<sup>20</sup>

temperature regulation.<sup>278<sup>1</sup></sup> Studies in the use of therapeutic hypothermia have shown the efficacy of magnesium in lowering body temperatures. This

supports the use of transdermal magnesium 20

therapy for surface cooling by non-invasive methods. <sup>2782</sup>

Body temperature may be regulated by magnesium in two ways. One is through its central sedative effect on the hypothalamus and the second through its peripheral effect achieved by reducing the neuromuscular excitability. Magnesium is lowered during hyperthermia due to its loss via sweat and magnesium diuresis.

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<sup>2783</sup> Since we see that magnesium plays a significant role in regulation of blood sugars and regulation of body temperature, it makes good sense to utilize magnesium for the treatment of vasomotor symptoms during menopause and we can expect to find great improvement, more comfort, less mood disturbance and a smoother transition to postmenopause. In addition magnesium serves as a natural muscle relaxant, making it useful for relieving such symptoms as muscle cramping and anxiety.

## 1. Magnesium & Diabetes

Magnesium affects carbohydrate metabolism by influencing the release and activity of insulin, the hormone that controls blood sugar levels, by influencing the resistance and sensitivity to insulin. Magnesium for diabetics is critical. At least 25 percent 20 20

of diabetics have hypomagnesemia, <sup>278</sup> 74 and this is likely a gross underestimate.

Dr. Carolyn Dean indicates that magnesium deficiency may be an independent predictor of diabetes and that diabetics both need more magnesium and lose more magnesium than most people.

Magnesium is necessary for the production, function, and transport of insulin. Magnesium deficiency is associated with insulin resistance and increased platelet reactivity.

According to Dr. Jerry L. Nadler, “The link between diabetes mellitus and magnesium deficiency is well known. A growing body of evidence suggests that magnesium plays a pivotal role in reducing cardiovascular risks and may be involved in the pathogenesis of diabetes itself. While the benefits of oral magnesium supplementation on glycemic control have yet to be demonstrated in patients, magnesium supplementation has been shown to improve insulin sensitivity. Based on current knowledge, clinicians have good reason to believe that magnesium repletion may play a role in delaying type 2 diabetes onset and potentially

in warding off its devastating complications—cardiovascular disease, retinopathy, and nephropathy.”

A separate Gallup survey (in 1995) of 500 adults with diabetes reported that 83 percent of those with diabetes are consuming insufficient magnesium from food, with many by significant 20 20

margins. <sup>278 75</sup> One group has recently suggested that the effects of reduced glutathione on glucose metabolism may be mediated, at 20 20

least in part, by increased intracellular magnesium levels. <sup>278 76</sup>

The mechanism of hypomagnesemia in diabetic patients still remains unsolved but there is enough evidence to suggest that magnesium levels drop in the course of recovery from ketoacidosis 20 20

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during insulin therapy, <sup>278 77</sup> or with severe retinopathy, <sup>278 78</sup> or 20 20

proteinuria. <sup>278 79</sup> Diabetic patients, especially those with poor glucose control, develop hypomagnesemia from a glucose-induced osmotic diuresis.

Insulin resistance and magnesium depletion may result in a vicious cycle of worsening insulin resistance and decrease in intracellular  $Mg(2+)$ , which may limit the role of magnesium in 20 20

vital cellular processes. Diabetic ketoacidosis (DKA) <sup>279 70</sup> is a state of inadequate insulin levels resulting in high blood sugar and accumulation of organic acids and ketones in the blood.

Increased blood acids (ketoacidosis) can be an acute complication of diabetes. It occurs when your muscle cells become so starved for energy that your body takes emergency measures and breaks 20

down fat, a process that forms acids known as ketones. <sup>279<sup>1</sup></sup>

Hyperglycemia initially causes the movement of water out of cells, with subsequent intracellular dehydration, extracellular fluid expansion, and hyponatremia (sodium loss). It also leads to a diuresis in which water losses exceed sodium chloride losses.

It is believed that magnesium is also lost by osmotic action.

Urinary losses then lead to progressive dehydration and volume depletion, which causes diminished urine flow and greater retention of glucose in plasma. The net result of these 20

alterations is hyperglycemia with metabolic acidosis. <sup>279<sup>2</sup></sup>

Proteinuria is protein in the urine, caused by damaged kidneys and a declining ability of the kidneys to protect the body from protein loss. This is frequently seen in longstanding diabetes, hypertension, as well as other chronic renal conditions. In the United States, diabetes is the leading cause of end-stage renal disease (ESRD), the result of chronic kidney disease. In both type 1 and type 2 diabetes, the first sign of deteriorating kidney function is the presence of small amounts of albumin in the urine, a condition called microalbuminuria. As kidney function declines, the amount of albumin in the urine increases and microalbuminuria becomes full-fledged proteinuria. During insulin treatment, neither magnesium nor potassium can be metabolized properly, so these essential minerals must be replaced.

Severe symptomatic hypermagnesemia is relatively rare. But high levels of magnesium can develop in people with severe renal 20

insufficiency or renal failure,<sup>2793</sup> because the kidneys lose the ability to remove excess magnesium. Magnesium is regulated and excreted primarily by the kidneys where various ATPase enzymes 20 20

are responsible for maintaining homeostasis.<sup>279 74</sup> However hypermagnesemia can also occur in people with hypothyroidism, those using magnesium-containing medications such as antacids, laxatives, cathartics, and in those with certain types of gastrointestinal disorders, such as colitis, gastroenteritis, and gastric dilation, which may cause an increased absorption of magnesium.

There are two mammoth factors linked to the horrendous rise in diabetes in adults and children that the western medical establishment has not paid attention to. The first is deficiency in magnesium, and the other is chemical poisoning. The convergence of large drops in cellular magnesium, which offers protective coverage against chemical toxicity and increasing poisoning of people's bloodstreams with heavy metals like arsenic and mercury as well as a literal host of other chemical toxins in the environment, are teaming up to create a pandemic. Eating junk food fits right into this alarming picture for poor diet translates immediately into massive magnesium deficiencies, and modern processed food is also high in chemical preservatives and pesticides that are detrimental to health.

Diabetes gives us a clear picture of how the human race is being caught between a rock and a hard place, a kind of devil's anvil of our own making. The human body is failing to deal with massive chemical exposure in the face of hugely increasing deficiencies in basic nutrients like magnesium. Malnutrition is now in bloom in the first world even among the obese who eat too much of the wrong foods.

Magnesium deficiency is a predictor of diabetes—as already stated, diabetics both need more magnesium and lose more magnesium than most people. In two new studies, in both men and women, those who consumed the most magnesium in their diet were least likely to develop type 2 diabetes, according to a report in the January 2006 issue of the journal *Diabetes Care*. Until now, very few large studies have directly examined the long-term effects of dietary magnesium on diabetes. Dr. Simin Liu of the Harvard Medical School and School of Public Health in Boston says,



“Our studies provided some direct evidence that greater intake of dietary magnesium may have a long-term protective effect on lowering risk.” See “Diabetic Neuropathy,” which introduces the concept of administering mega doses of magnesium to heal diabetic neuropathy.

Prolonged use of magnesium will prevent

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chronic complications from diabetes. <sup>279</sup> 75

“The current ‘party line’ on this subject is not universally accepted, but many of us believe the establishment is too conservative and will someday change. While admitting its importance, for some unknown reason they remain reluctant to recommend magnesium supplements. They just do not know how poor the American diet is in magnesium and the frequency of magnesium 20 20

deficiency,” says Dr. Mansmann. <sup>279</sup> 76

Poorly controlled diabetes increases

loss of magnesium in urine.

It would be prudent for physicians to consider magnesium deficiency as a contributing factor in many diabetic complications and as a main factor in exacerbation of the disease itself . Recent research from many sources suggests that magnesium for the treatment of diabetes should be paramount in physicians’ minds. In one study, after only eight weeks of oral magnesium, thermal hyperalgesia was normalized and plasma magnesium and glucose levels were restored towards normal in 20 20

rats. <sup>279</sup> 77

Repletion of the deficiency with transdermal magnesium chloride 20 20

mineral therapy <sup>279</sup> 78 is the ideal way of administering magnesium in medically therapeutic doses. Such treatments will, in all likelihood, help avoid or ameliorate such complications as diabetic peripheral neuropathy,

arrhythmias, hypertension, and sudden cardiac death and will even improve the course of the 20 20

diabetic condition in general. <sup>279</sup> 79

## 1. Principles & Practices of Transdermal Medicine Transdermal medicine delivers

medications to the exact site of injury/pain.

Transdermal medicine is ideal for pain management as well as sports and pediatric medicine. In fact it is one of the best ways of administering medicines quickly and effectively. Transdermal methods of delivery are widely used because they allow the absorption of medicine directly through the skin. Gels, emulsion creams, sprays and lip balm stick applicators are easy to use and are effective in getting medicine into the bloodstream quickly.

Traditional methods of administering medicine such as tablets or capsules get watered down and become much less effective due to stomach acids and digestive enzymes, before they eventually get into the bloodstream.

Bypassing the stomach and liver means a much greater percentage of the active ingredient goes straight into the bloodstream where it's needed. In many cases, transdermal methods are used to help avoid potential side effects such as stomach upset or drowsiness. The full potential for transdermal medicine has not been explored by modern medicine

though it has been practiced for thousands of years in hot springs around the world.

Drugs enter different layers of skin via intramuscular, subcutaneous, or transdermal delivery methods.

The most common ways to administer drugs are oral (swallowing an aspirin tablet), intramuscular (getting a flu shot in an arm muscle), subcutaneous (injecting insulin just under the skin), intravenous (receiving chemotherapy through a vein), or transdermal (wearing a skin patch). It is not a surprise, when you consider the large surface area of the skin, that when you apply a

substance to the entire body, rapid absorption and resultant effect is sufficient to put transdermal administration on par with or even ahead of other methods of administering drugs.

This book heralds a paradigm shift in magnesium medicine and is able to make the claims it does because of the medical dimensions that open up when magnesium chloride is used transdermally. The transdermal approach to magnesium supplementation allows an intensity of application that only daily injections can achieve.

When patients could take magnesium tablets of one kind or another orally, dosages remain limited because of either gut absorption problems and/or because high oral dosages provokes loose stools and diarrhea.

Dead Sea Has Highest Concentration of Magnesium Before her first trip to the Dead Sea, 40-year-old Rhonda Dupras didn't even own a pair of shorts. Suffering from severe psoriasis over her entire body, Dupras normally cloaked herself in long sleeves and long pants, hiding her red, flaky, scaly skin from curious stares and prying questions. But after three weeks of soaking up the Dead Sea sunshine under a doctor's care at her health hotel in Israel, Dupras' skin was tanned, glowing, smooth and virtually clear of flakes and patches. She cried like a baby, she says, and promptly bought shorts to celebrate. "I ended up showing off my skin to everyone. I just couldn't help myself,"

she says. Her remission lasted four giddy months. She did not know that one can recreate the conditions of the Dead Sea in her bathtub.

Transdermal medicine is a versatile form of medicine everyone can use and benefit from. With transdermal medicine we can address systemic nutritional deficiencies, act to improve immune, hormonal and nervous systems, protect cells from oxidative damage, open up cell wall permeability, reduce the risk of cancers, shrink tumors and do just about anything else we do with oral and intravenous methods of application.

Now imagine receiving your medical treatment right in the comfort of your own home if you cannot get to the warm seawater.

Transdermal magnesium therapy is ideal for pain management. The combination of heat and magnesium chloride increases circulation and waste removal. The therapeutic effect of magnesium baths is to draw inflammation out of the muscles and joints. Magnesium chloride, when applied directly to the skin is transdermally absorbed and has an almost immediate effect on pain.

What better way to reduce or eliminate pain than by simply taking a therapeutic bath or rubbing magnesium chloride in liquid form directly onto the skin or affected area of the body? From the pain of sports injuries to low-back pain and sciatica, headaches, relief from kidney stones, the pain of restless legs, arthritic pain, and just about every painful condition imaginable—all will in all likelihood benefit from magnesium applied topically.

Medicines taken by mouth (oral) pass through the liver before they are absorbed into the bloodstream. Transdermal application bypasses the liver, entering the tissues and blood more directly.

Magnesium oil can be applied directly to inflamed areas.

Transdermal magnesium therapy offers an exciting breakthrough in sports medicine. Coaches can now treat injuries, prevent them, and increase athletic performance all at the same time.

Transdermal magnesium chloride mineral therapy enhances recovery from athletic activity or injuries. It reduces pain and inflammation while propagating quicker regeneration of tissues.

Topical application of magnesium chloride increases flexibility, which helps avoid injury. It also increases strength and endurance. Transdermal magnesium therapy is a boon for athletes, coaches, and doctors who practice sports medicine.

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The use of transdermal patches <sup>370</sup> 70 is fairly new. These patches contain a drug reservoir that holds an opioid that is delivered through contact with the

patient's skin. These can be helpful in delivering a more potent form of pain medication in a more controlled manner outside of the hospital or in relieving pain post-operatively and in post-radiation burns (tissue burn patients).

Transdermal delivery of medicines is

generally considered safer, more efficient, convenient and less painful than injections or IVs.

The ideal transdermal treatment includes the healing radiation of the sun with all the resultant increases in levels via the skin.

This is transdermal medicine at its best. Going down to the ocean is one of the finest medical treatments in the world and the cheapest if you have easy access to a place where the ocean waters are warm so you can stay in the water for a good length of

time. Not only does one receive a strong dose of magnesium from the ocean but there is also iodine in the air and the sun beating down with its life-giving rays. The Dead Sea is even stronger in this regard for the magnesium is already highly concentrated in the water.

Dermatologists unfortunately have destroyed the image of healing at the beach because of the sun. They would have you do transdermal medicine practiced at its worst by having you apply toxic sunscreens that block vitamin D formation while synthetic pharmaceutical chemical substances seep into the body. The sun is more important to health than we would suppose and is in reality one of the best anti-cancer agents we have. The truth is exactly 180 degrees opposite to what the doctors would have us believe and that makes dermatologists into terrific liars. (See chapter on vitamin D and the sun on my Natural Allopathic Medicine site.

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<sup>3701</sup> )

Absorption

Medicines can enter the body in many different ways, and they are absorbed when they travel from the site of administration into the body's circulation. A drug faces its biggest hurdles during absorption. Medicines taken by mouth are shuttled via a special blood vessel leading from the digestive tract to the liver, where a large amount may be destroyed by metabolic enzymes in the so-called "first-pass effect." Other routes of drug administration bypass the liver, entering the bloodstream directly from or via the skin or lungs.

Human skin is like a tightly woven fabric, seemingly impervious but porous at the microscopic level. Through its millions of tiny openings, the body oozes sweat and absorbs substances applied to the skin. For a topical agent to be effective, obviously it must first be absorbed. The drug must enter in adequate concentration to its proposed site of action to produce the desired response of the skin. This skin is involved in dynamic exchange between the internal and external environments through respiration, absorption, and elimination. It is highly permeable even though it has the ability to maintain its important bacteria-inhibiting barrier with the environment.

Individuals vary in the amount of medication they absorb through the skin.

In transdermal medicine substances are applied to the skin's surface and then diffuse into the stratum corneum where they build a reservoir and diffuse through the stratum spinosum. At this point, they can be metabolized and bind to receptors thus exerting their effects. Finally whatever healing or medical substance is applied is delivered into subcutaneous fat, the circulatory system achieving overall systemic penetration.

The concentration of the applied dose, the surface area of the body, and the elapsed time the chemical is on the skin are the main considerations affecting absorption. As the concentration of a drug is increased, the total amount absorbed into the skin and body also increases. Increasing the surface area of the applied dose also increases penetration.

Penetration occurs over time. The longer the substance is on the skin, the greater the chance for continued penetration. The total amount of a drug

absorbed during a 24-hour period obviously will be different for a single application as opposed to the same amount applied in divided doses. In other words, applying a medicine once a day in the morning delivers a different concentration as opposed to applying a medicine three times a day, eight hours apart.

When using transdermal medicines, applying more of a substance increases the amount absorbed. Penetration will stop generally when the skin is saturated. Absorption into the bloodstream is also increased if the concentration of a substance is higher and if more of the body is covered. Occluded (covered) or well-hydrated skin is easier to penetrate than non-occluded or dry skin.

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There are many things that affect skin absorption . <sup>370</sup><sup>2</sup>

Absorption occurs by distribution around and through the cells that make up the skin. Some absorption takes place along hair follicles or through sweat ducts. Skin thickness and barrier accessibility are different in various areas so absorption rates will vary in different parts of the body. For example, hydrocortisone (a synthetic preparation used in the treatment of inflammations, allergies, and itching) is absorbed through the skin six times better on the forehead than on the arm, and 44

times better on the scrotum.

The physical condition of the skin is a significant variable. The skin of an infant or child is more permeable than an adult. The skin over the organs in decreasing order of permeability is 20

genitals, head and neck, trunk, arms and legs. <sup>370</sup><sup>3</sup> Skin abrasion allows a locally applied substance to come directly in contact with subcutaneous tissue and blood vessels. Absorption is at a much higher rate than in healthy skin. Inflammation leaves the skin leaky and allows larger molecules to be absorbed.

Transdermal Medicine & Skin Cancer

Dr. Tullio Simoncini states, “ Every tumour of the skin can be completely removed with iodine tincture 7 percent, brushed many 20 20

times (10-20) a day. <sup>370 74</sup> When the crust is formed, don’t take it away but treat the area continuously and wait until it falls without any other intervention except the iodine tincture. When the crust falls down the third time, the patient is healed.”

“In cases where the tumor has invaded a coetaneous-mucous transitional zone like the anus, eyelids, vagina, or mouth,”

Simoncini continues saying, “it is necessary to perform a preliminary treatment of the mucous area with sodium bicarbonate and then, after the elimination of the colonies existing there, proceed to treat the cutis with iodine solution. It is appropriate to highlight that the same type of therapy is to be applied also to psoriasis and to the known fungi afflictions. In fact, the difference between coetaneous mycosis, psoriasis, and tumors consists only of a variation of aggressiveness and thus of depth of rooting, since the causal agent is always the same: a fungus . Sometimes for the therapy, other corrosive salts can be used in function of the location in the body.”

What gets in through the skin can get out.

Thus it is in a physician’s favor to become familiar with the keys to the skin’s permeability. In general, heat, activity, and body temperature facilitate the ease with which these “border exchanges” can take place.

Oral vs. Transdermal

The most limiting factor to adequate magnesium absorption by oral supplementation is diarrhea. When taking orally the amount of magnesium necessary to use as a medicine, most people experience loose stools and this again reduces absorption because the magnesium moves through the system too fast. This can be avoided by use of transdermal application of magnesium chloride. In this way we bypass completely the digestive tract and avoid these problems.

In his book, Holy Water, Sacred Oil; The Fountain of Youth , Dr.



Norman Shealy states that the dilemma with oral magnesium compounds are that they have a laxative effect. He also states that there is reliable evidence that magnesium absorption relies upon the mineral's staying power in the intestine—at least 12

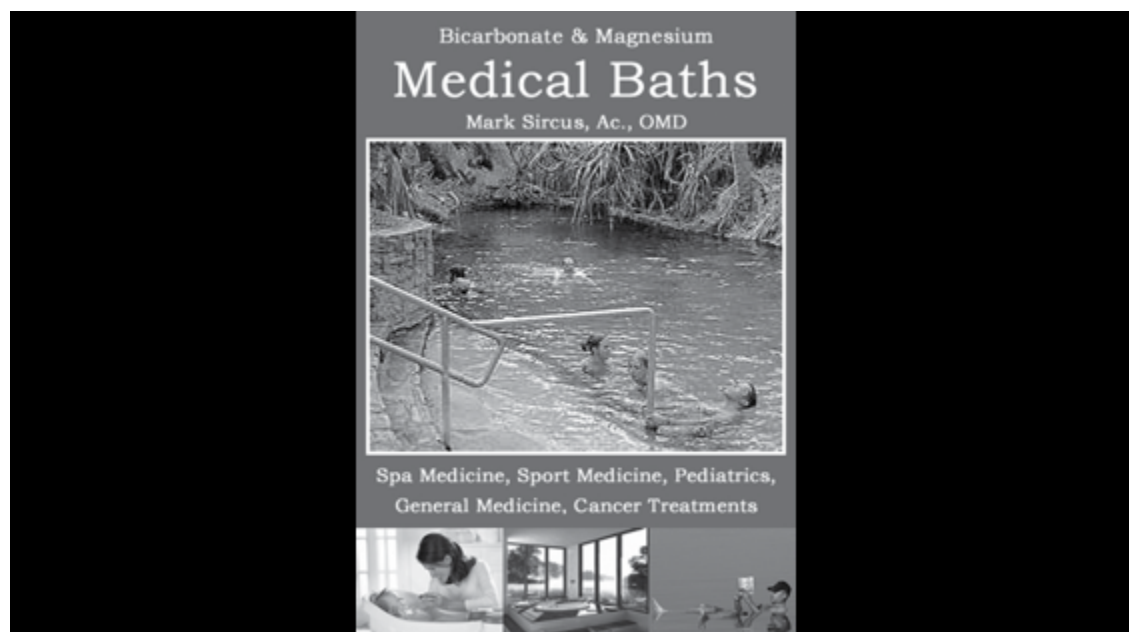
hours. If, for some reason, the transit time is less than 12

hours, magnesium absorption is drastically impaired.

The application of magnesium chloride to the skin is very well tolerated, gets absorbed quickly and is inexpensive.

Dr. Shealy published a study on magnesium chloride in which the magnesium was used both transdermally and in a footbath. Sixteen individuals with low intracellular magnesium were brought in and were asked to do a 20-minute foot soak in conjunction with spraying their entire body once daily. Intracellular magnesium tests were done on all participants to document their deficiency and another test was done a month later. Twelve of the 16

individuals, which equates to 75 percent, had substantial improvements in their intracellular magnesium levels.



Test results before and after four weeks of foot soaks and daily body spraying:

## 25 . Combining Oral with Transdermal

**Dose Sensitivity & Therapeutic Effect** One of the most luxurious medical treatments on earth is to receive magnesium massages on a consistent basis. Having an ounce of magnesium oil rubbed over your body by either a trained massage therapist or by a loved one is heavenly. Also you can do this yourself by covering your body all over with the magnesium oil like you would sunscreen and go out in the sun and have some fun.

Another method of administration is to pour a high concentration of magnesium chloride into your hot bathtub, perhaps with a pound or two of sodium bicarbonate added in. On page 201 of the first edition I recommend 2-8 ounces (56-226 grams) of magnesium oil for a full body bath (ca 100 liter). These initial recommendations for baths were low. I am now recommending much higher dosages for baths ranging anywhere from 2-4 pounds of magnesium flakes for professional use in clinics and spas. You can buy magnesium flakes of high quality (low heavy metal profile) in quantity and use three pounds (which is equivalent to 20 20

a gallon of oil) in an adult bath. <sup>370 75</sup> You can also use Dead Sea salt or Epsom salts but they will not quite reach the concentration level that magnesium chloride will.

We are not talking about a hot magnesium bath for simple relaxation and general body tonification but professional baths intended for strong therapeutic effect. The percent of magnesium in the bath under my old recommendations came to only 45-180 mg/l magnesium. When you discover that open seawater has a content of 1300 mg/l magnesium we see that my early recommendations were

low. The driving force behind transdermal intake is the concentration gradient.

The concentration of magnesium in the pure magnesium oil is about 80,000 mg/l and when you apply that directly on the skin, intake rate is high. But in

the case of a bath application concentrations need to be brought up to between 1500 and 5000 mg/

l magnesium (1-4 times the sea concentration). Dead Sea therapy 20 20

<sup>370</sup> 76 has a concentration of up to 40,000 mg/l magnesium and people bathe every day in these waters.

Fick's Law of Membrane Permeability says that the amount of any solute (magnesium) that will be absorbed is directly dependent upon the area of contact, the concentration of the solution and 20 20

the time that the solute is in contact with the membrane. <sup>370</sup> 77

### Oral Administration

The best way to practice magnesium medicine is to combine 20 20

transdermal application with oral administration <sup>370</sup> 78 for concentrated doses that achieve maximum therapeutic effect. When practicing medicine we are looking to change people's conditions quickly and we do that best when we take doses up to the maximum.

Each spray of magnesium oil contains approximately 20 20

18 milligrams of elemental magnesium. <sup>370</sup> 79 An ounce would contain just over 3,300 mg. Five sprays in a 20

glass of water would thus be almost 100 milligrams. <sup>3170</sup>

From 3-5 to as much as 10-15 sprays of magnesium chloride in a glass of pure water or juice is an excellent way to take magnesium internally. It assists digestion, counteracts excess acidity in the stomach, and delivers magnesium swiftly into the bloodstream for distribution to all the cells of the body.

Minerals like magnesium in ionic liquid form are superior to pill forms. More magnesium will get absorbed and absorption will not depend so much on hydrochloric acid levels.

There are over 200 published clinical studies documenting the need for magnesium and many examples of miraculous “cures” from the use of this common mineral. Yet DAN (Defeat Autism Now) doctors underestimate autistic children’s needs recommending only 50 mg twice a day in oral form even though children with gut problems can absorb only small percentages through their intestines.

The autism community needs to be aware that its present dependency on low dosage of magnesium supplementation is responsible for their less than excellent results from chelation.

A complete changeover to transdermal/topical approaches is necessary with these children because their guts are compromised

meaning they cannot absorb magnesium through oral consumption.

Fifty milligrams twice a day is too low.

The basic principle of natural allopathic medicine is just the opposite of orthodox allopathic medicine. Instead of using poisons at low doses we use concentrated nutritional substances at exceptionally high dosages.

If someone is having a stroke or heart attack you certainly do not want to throw them into a bath with only four ounces of magnesium inside.

My suggestion for cancer patients and anyone else with serious illness is to bring levels of substances like magnesium chloride, iodine and sodium bicarbonate up to very high levels. The dose makes the effect in natural allopathic medicine where the dose makes the poison in modern medicine. When we are confronting serious chronic or even acute situations we want to maximize the strength of our treatments.

A sane rule of thumb for magnesium supplementation (not for therapeutic effect) is approximately 6-8 mg/kg (3-4 mg per pound) bodyweight per day. That translates into a total dietary magnesium intake of 600-900 mg per day for a 200-lb man, which is already above the RDA—about double. With children some researchers indicate that 10 mg/kg/day are appropriate because of their low bodyweight and increased requirements for growth.

Athletes also need more depending on their stress and training levels and we can always adjust upwards when under great emotional stress or when seriously ill. These are good dosages for oral intake but should be augmented with strong transdermal treatment.

Our cells are best served when they  
are brimming with magnesium reserves.

In general, for a large adult, spraying an ounce or more of magnesium oil a day all over the body is recommended for six months to recover cellular levels with that adjusted downward for children depending on their age and size. This coupled with oral intake, especially for adults, is necessary to get the maximum effect out of magnesium. When magnesium levels are at extremely low levels intravenous application is an option and is necessary in emergency situations. Very strong therapeutic magnesium baths yield another level of effect. Such baths compete handily with intravenous applications but they are not a substitute for them in emergency situations.

Magnesium chloride and vitamin C have similar toxicity profiles with overdose from both resulting at worst usually

in diarrhea unless the kidneys are seriously compromised.

Strong therapeutic foot soaks are another option and are important for diabetics who suffer from diabetic neuropathy .

Soak the whole body or just the feet in bath water for 20-30

minutes at a temperature of about 108 degrees. The most effective protocol for this therapy is to begin with a daily full-body bath or footbath every day for the first seven days (starting at lighter concentrations and building up), then continue with a maintenance program of 2-3 times a week for 6-8 weeks or longer.

Sensitive care must be taken especially with children as to dose levels, water temperature and magnesium concentrations. Muscle spasms might occur on rare occasions if one forgets to get out of the tub so it is necessary

to supervise children and the length of time they remain soaking in magnesium chloride. All strong reactions like redness in local areas to diarrhea or even muscle spasms are indications to reduce concentration.

As with anything, caution should be taken in the beginning until one gets a feel for the appropriate dosages, especially with children. The dosage must be adjusted according to the person's needs and his size (bodyweight). The actual amount used is also dependent on the method of use or the combinations of methods used. Magnesium chloride may be taken orally, applied directly to the skin (used in a massage or simply rubbed on), used in footbaths, in full-body baths, and sprayed into mucus membranes.

The magnesium oil can and should be diluted when applying directly to the skin (especially with children) if redness or

“stingy” feelings result in uncomfortable feelings or sensations.

If one is suffering from long-term illness of any kind, dosages, whether orally or topically administered, should be started at lower levels and brought up gradually.

Food Sources of Magnesium:

Spirulina, 1 oz – 110 mg

Tofu, firm, 1/2 cup – 118 mg

Chili with beans, 1 cup – 115 mg

Wheat germ, toasted – 1/4 cup 90 mg

Halibut, baked, 3 ounces – 78 mg

Swiss Chard, cooked, 1 cup – 75 mg

Peanut, roasted, 1/4 cup – 67 mg

Baked potato with skin, 1 medium – 55 mg Spinach, fresh, 1 cup – 44 mg

— Source: USDA: Composition of Foods. USDA Handbook No. 8 Series  
Washington, D.C., ARS, USDA, 1976-198 6

Dr. Raul Vergin offers the following guidelines for oral intake of a 2.5 percent magnesium chloride hexahydrate ( $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ) solution (i.e., 25 grams or approximately one ounce of pure food-grade powder in a liter of water). The quantity of elemental magnesium contained in a 125 cc dose of the 2.5 percent solution is around 500 mg.

Dosages are as follows:

Adults and children over 5 years old 125 cc 4 year old children 100 cc

3 year old children 80 cc

1-2 year old children 60 cc

Over 6 months old children 30 cc

Under 6 months old children 15 cc

125 milliliter = 4.2267528 ounce [US, liquid]

cc & ml are equivalent

Dr. Vergin indicates that, “In acute diseases the dose is administered every 6 hours (every 3 hours the first two doses if the case is serious); then space every 8 hours and then 12 hours as improvement goes on. After recovery it’s better going on with a dose every 12 hours for some days. As a preventive measure, and as a magnesium supplement, one dose a day can be taken indefinitely. Magnesium chloride, even if it’s an inorganic salt, is very well absorbed and it’s a very good supplemental magnesium source.”

Daniel Reid says, “Using magnesium oil is the quickest and most convenient way to transmit magnesium chloride into the cells and tissues through the skin. As a highly effective deodorant, 2-3

sprays under each armpit works well, while at the same time transporting magnesium swiftly through the thin skin into the glands, lymph channels, and bloodstream for distribution throughout the body. Spray it onto the back of the hands or the top of the feet any time of the day or night for continuous magnesium absorption. Regardless of where you apply the spray on the body, once it penetrates the surface of the skin, the body transports it to whichever tissues need magnesium most.”

## 1. Magnesium Administration

The only real challenge with magnesium is getting it into your body, because most products are poorly absorbed and cause diarrhea.

But once I solved this problem and was able to increase my magnesium intake, my pain quickly eased and my disorder gradually faded.

Dr. Jay S. Cohen

The use of high oral doses of magnesium has typically been precluded because of magnesium’s tendency to provoke diarrhea in many patients when administered orally. For example, in one study a dosage of 250 mg of magnesium administered orally two times daily produced adverse intestinal effects in 45.7 percent of subjects. For many years oral dosing was without question the administration route of choice for most doctors and healthcare practitioners. Intravenous drug administration requires that the patient be in a hospital or clinic though when the condition being treated is chronic, this is impractical and expensive.

Administration with magnesium at pharmacologic doses is crucial to treating chronic conditions that are arising from common and persistent magnesium deficiencies. However oral dosing at pharmacologic levels has heretofore been ineffective due to the inability of patients to tolerate such a regimen. This problem is now academic since the advent of transdermal dosing, which has arisen in popularity only in the last three years.



There have been several doctors who have been able to optimize oral intake through several daily administrations, totaling approximately 2-12 times the RDA for magnesium (600-5,000 mg elemental magnesium). Dr. Jay S. Cohen, a nationally recognized expert on medications and side effects and the author of *The Magnesium Solution for High Blood Pressure*, submitted a patent with this gradually increasing oral protocol. These higher levels are achieved through increasing daily dosage amounts gradually in response to patient tolerance and using a more well-tolerated form of magnesium, preferably a magnesium chloride solution.

Total magnesium intake is divided over several doses per day and taken with copious amounts of water.

Orally administered magnesium dosage levels can be increased gradually over time from about 250 to 500 mg elemental magnesium/

day to between about 600 mg and 5,000 mg/day elemental magnesium, wherein each orally administered daily dosage amount is divided into smaller doses and orally administered several times per day.

The orally administered daily dosage amount is gradually increased over time and in association with patient's increased tolerance to the increased dosage, and the administered magnesium is in a solid form or a solution; and maintaining a well-tolerated high-level dosage of orally administered magnesium until cell levels rise and signs and symptoms recede. One retired doctor with diabetic neuropathy was able to tolerate up to 20

grams (20,000 mg) a day in this way and was able to control his neuropathy.

The preferred magnesium treatment uses a magnesium compound in solution, such as intravenous grade  $\text{MgSO}_4$  or  $\text{MgCl}$  in water or dextrose solution. Other magnesium compounds effective in the present invention include magnesium acetate, magnesium carbonate, magnesium citrate, magnesium gluconate, magnesium glycinate, magnesium hydroxide, magnesium maleate, magnesium orotate, magnesium oxide, magnesium succinate, magnesium taurate, and chelated forms of magnesium with proteins or amino acids.

If you're ever rushed to the hospital with a heart attack, intravenous magnesium could save your life. In a 1995 study, researchers found that the in-hospital death rate of those receiving IV magnesium was one-fourth that of those who received standard treatment alone. In 2003, a follow-up study of these same patients revealed an enduring effect of magnesium treatment.

Nearly twice as many patients in the standard treatment group had died compared to those who received magnesium, and there were considerably more cases of heart failure and impaired heart function in the placebo group.

In addition to increasing survival after heart attack, IV

magnesium also smoothes out arrhythmias and improves outcomes in patients undergoing angioplasty with stent placement. It is also beneficial for acute asthma attacks, often working to relax airway spasms when drugs do not. Magnesium supplementation is crucial for diabetics too because it improves insulin sensitivity, helps blood sugar control, and reduces risk of retinopathy.

Therapy with magnesium is rapid acting, has a safe toxic-therapeutic ratio, and is easy to administer and titrate. <sup>311</sup>

Magnesium is economical, widely available, and has a long established safety and tolerability profile in myocardial infarction. Magnesium chloride has the advantage of being administered intravenously, intramuscularly, and orally as well as vaporized through a nebulizer, and as a lotion transdermally.

In anesthesia and intensive care, the preferred administration route is IV.

Magnesium ions cross the intact blood-brain barrier efficaciously so that intravenous magnesium significantly and quickly raises magnesium levels in cerebrospinal fluid and brain extracellular fluid.

In the 90s cardiovascular biologist Dr. Burton M. Altura of the State University of New York Health Science Center at Brooklyn witnessed a therapeutic benefit of magnesium in acute symptoms such as headache pain.

Altura administered a solution containing one gram of magnesium sulfate intravenously to 40 patients who visited a headache clinic in the throes of moderate to severe

pain. They treated not only migraine sufferers but also persons with cluster headaches and chronic daily headaches.

Within 15 minutes, 32 of the men and women—80 percent—experienced relief. Though the headache may not have vanished, the pain lessened by at least 50 percent. In 18 of these individuals, the pain relief lasted at least 24 hours. Blood tests before treatment confirmed that all but four in this latter group had ionized magnesium concentrations that were lower than the average in a related group of pain free individuals. “All nine patients with cluster headaches had their acute headache aborted by magnesium therapy.” Migraine sufferers who responded to the treatment experienced a complete alleviation of their current symptoms, including sensitivity to lights and sound. Subsequent studies of additional migraine patients have confirmed a common pattern, Altura says. “Those patients where ionized magnesium in the brain or blood is low will respond to intravenous magnesium very quickly and dramatically.”

Transdermal medicine is an extraordinary method of magnesium application that has not been studied by allopathic medical science. This chapter focuses on western medicine’s experience with intravenous magnesium infusions and injections. Doctors need to learn about and use the wide spectrum of administration routes to harness the full medicinal power of magnesium.

Heart palpitations, “flutters” or racing heart, otherwise called arrhythmias, usually clear up quite dramatically on 500 milligrams of magnesium citrate (or aspartate) once or twice daily or faster if given intravenously.

Dr. H. Ray Evers

Cardiac arrhythmias and coronary artery vasospasm can be caused by magnesium deficiency and intravenous magnesium reduces the risk of arrhythmia and death immediately after acute myocardial infarction.<sup>312</sup>

A study published in The Lancet reported the effects of a double-blind, randomized, placebo-controlled study in 2,316 patients with suspected myocardial infarction. The dose of magnesium was high (about 8.7 grams given intravenously over a 24-hour period), but the results were remarkable: magnesium reduced cardiovascular mortality by 25 percent. Teo and colleagues, in an analysis of seven clinical studies, concluded that magnesium (in doses of 5-10 g by intravenous infusion) reduced the odds of death by an astounding 55 percent. Two forms of Mg are available, namely Mg chloride and Mg sulfate for infusion. Ten milliliters of a 10

percent Mg chloride ( $\text{MgCl}_2$ ) solution provide 1 g of Mg salts (=

118 mg Mg = 9 mEq = 4.5 mmol), and 10 mL of a 10 percent Mg sulfate ( $\text{MgSO}_4$ ) solution provide 1 g of Mg salts (= 98 mg Mg =

8.12 mEq = 4.06 mmol).

Although intravenous magnesium is the drug of choice at the onset of a heart attack, it is not mentioned in the section on arrhythmias in the 1989 “Compendium of Drug Therapy.”

Dr. H. Ray Evers

Dr. Sarah Myhill has been using IV magnesium in her general practice for over 15 years for both acute and chronic problems.

She uses it for all patients with acute chest pain (unless the blood pressure is very low), acute heart failure, pulmonary embolus and acute asthma. Myhill says, “It is a potent vasodilator—i.e. it opens up all the blood vessels. Indeed patients can feel their blood vessels dilating as I give them the magnesium—they warm up all over! This has the immediate effect of reducing the work of the heart and opening up the co-lateral circulation of the heart. Most of the patients with acute heart attacks have their pain completely relieved by IV magnesium.

“I then give them morphine as well (standard treatment) to relax them and take the stress out of the situation. (Anyone having a heart attack will naturally be in fear of their life—the panic and adrenaline this creates puts

even more stress on the heart.) It is anti-dysrhythmic—most patients who die from a heart attack do so because the pacemaker is disturbed and the heart goes off into an abnormal beat. Magnesium is highly protective against this. It inhibits blood clotting and so reduces the likelihood of further clogging of the blocked artery.”

Myhill continues, “It protects against ‘stunning’ or reperfusion injury. After an acute heart attack, the muscle dies and becomes the infarcted area. With recovery there may be renewed blood supply to the damaged area. The damaged heart muscle may not be able to cope with the renewed oxygen supply and may suffer stunning—an acute loss of its contractile ability. This may explain deaths that occur a few hours or days after the initial infarction. In the many patients where I have injected magnesium prior to admission to the hospital, I have never had a patient die subsequently. Indeed I can relieve pain quickly and send them on greatly reassured that all will be well. This technique was taught to me by Dr. Sam Browne who documented his cases.” <sup>313</sup>

Magnesium has been used safely by doctors for over 60 years.

Magnesium’s powerful vasodilator action immediately became apparent with its action increasing in potency with increased initial blood concentrations. After magnesium infusions there is a significant increase in cardiac output, and the cardiac index is maintained at a higher level than that of control groups

during the induction of anesthesia and endotracheal intubation.

20

<sup>3174</sup>

The common procedure of invasive cardiac intervention and intravenous magnesium administration before reperfusion should without question become the gold standard in treatment of acute 20

myocardial infarction (AMI). <sup>3175</sup> Two meta-analyses studied the impact of magnesium treatment on reduction of the death rate and rhythm disorders in

the acute phase of myocardial infarction before initiation of reperfusion treatments. Both reports found a 54 percent reduction of the death rate, and one noted a decreased incidence (49 percent less) of ventricular fibrillation or 20

tachycardia in the population treated by magnesium.<sup>3176</sup> The most important action of MgSO<sub>4</sub> in AMI is to open up collateral circulation and relieve ischemia thus reducing infarct size and 20

mortality rates.<sup>3177</sup>

Magnesium is far down the pre-hospital protocol though and is not commonly used except in the case of early-recognized Torsades de Pointes, which is a special form of polymorphic ventricular tachycardia. Lidocaine is usually the first medication given someone suspected of heart attack, and its benefit is most likely limited to ventricular tachycardia caused by cardiac ischemia.

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<sup>3178</sup>

During myocardial infarction, serum magnesium drops. Heart muscle cells have a high concentration of total magnesium (11-17

mmol•L<sup>-1</sup> of intracellular water). Hypomagnesemia, defined as a plasma concentration below 0.7mmol•L<sup>-1</sup>, is considered severe when under 0.5 mmol•L<sup>-1</sup>. This condition is most often associated with a true depletion of magnesium in the organism, although a magnesium deficit can exist even when serum magnesium is normal because the serum levels are maintained within strict limits even as cellular levels drop. Measurement of the urinary excretion of magnesium and a loading test can help establish a diagnosis, though magnesium deficit can be universally assumed in most critically ill patients. Incidences of deficit are found to be much higher in patients sampled in surgical and medical intensive care units

. For patients with variant angina, 24-hour magnesium retention after intravenous magnesium loading was 60 percent, while it was only 36

percent in control subjects.

In the emergency treatment of tetanus magnesium infused at doses providing serum concentrations of 2-4 mmol•L<sup>-1</sup> allowed good control of spasms and muscle rigidity. Intubation and ventilation were only required for 43 percent of patients, 20

and the overall death rate was 12 percent. <sup>3179</sup>

Studies looking at the beneficial effects of magnesium administration to critically ill patients in the ICU with a wide

range of diagnoses showed that after infusion of 5 g of magnesium in D5W over 6 hours:

Heart rate came down within an average of 45 minutes; rhythm improved from irregular to regular and to good volume.

Urine output increased from almost oliguria (lack of urination) to 30-40 ml/hour; creatinine reduced or did not rise any further.

Pulmonary edema resolved in 24 hours.

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Lactic acidosis disappeared within 4-5 hours. <sup>3270</sup>

A total of 126 patients with proven angina have been treated with IV MgSO<sub>4</sub> and 116 have either been completely relieved of pain or markedly improved. <sup>321</sup> Most patients were given six IV injections of MgSO<sub>4</sub> (magnesium sulfate) with a total dose of between 24 and 48 mmol of Mg. If the patient is quite happy, the dose is often increased to 8 mmol given on a further five occasions either daily or weekly as is found convenient. In AMI, I give 7 mmol MgSO<sub>4</sub> with 5000 units of heparin in about 15 seconds after an initial 1 mmol has been given more slowly. Then, MgSO<sub>4</sub> (8 mmol) is given daily for 2-3 days, or for longer if chest pain recurs.

A further course of three doses of 8 mmol is given after 2-3

weeks. In AMI, the dose is reduced to 1 mmol or less repeated at 15-minute intervals if the blood pressure has fallen unduly.

In some patients with AMI, IV MgSO<sub>4</sub> can produce a fall in blood pressure that, if not excessive, may be more beneficial than harmful. In severe cardiogenic shock, the dosage of magnesium has been reduced from 8 mmol to 1 mmol or even 0.20 mmol repeated at 15-minute intervals with blood pressure monitoring until 4 mmol have been given.<sup>322</sup> Singh has reported dramatic improvement in severe shock using an IV vasodilator.<sup>323</sup>

The treatment to fully replete magnesium levels becomes even more urgent when pharmaceutical medications are used because most 20

drugs drive magnesium levels down further.<sup>3274</sup> Magnesium deficiency is routinely made worse by the very drugs meant to help heart problems. “Few doctors know that diuretics help flush magnesium as well as potassium from the body. The resulting magnesium deficiency hinders potassium use by the cells.

“Magnesium deficiency keeps people from replenishing potassium,”

says hypertension expert Dr. Chris Mende.

1. Magnesium Massage—Hospice & Palliative Care Hospice care is end-of-life care provided by health professionals and volunteers that give medical, psychological and spiritual support to help people have peace, comfort and dignity in their last days. The caregivers normally try to control pain and other symptoms so a person can remain as alert and comfortable as possible. Everyone facing life-threatening illness needs some

degree of supportive care in addition to treatment for their conditions.

You matter because of who you are. You matter to the last moment of your life, and we will do all we can, not only to help you die peacefully, but also to live until you die .

Dame Cicely Saunders



Palliative care is not the same as hospice care. The goal of palliative care is to relieve the pain, symptoms and stress of serious illness— whatever the prognosis . It is appropriate for people of any age and at any point in an illness. It can be delivered along with treatments that are meant to cure you.

Hospice care provides humane and compassionate care for people in the last phases of incurable disease so that they may live as fully and comfortably as possible until the end. Palliative care actually makes more sense because medical prognosis is often wrong. Not everyone given a terminal prognosis dies.

One of the problems with the concept of hospice is that it is often not started soon enough. Sometimes the doctor, patient, or family member will resist hospice because he or she thinks it means you're giving up or that there's no hope. This is not true; there is almost always hope. If you get better or the cancer goes into remission, you can be taken out of the hospice program.

It is amazing what can be done when we do things right, when we apply emergency and intensive care medicines every few hours, employing their life-saving effects for a few days. Medicines like magnesium chloride and sodium bicarbonate have the medical muscle to save people's lives in a heartbeat during emergency situations. Imagine employing this same power constantly throughout the day.

In general, as we age our tendency to compounded accumulative magnesium deficiencies only increases leaving us more vulnerable to a wide range of disorders and, in the final analysis, to a miserable death.

When we employ highly concentrated nutritional elements like magnesium chloride, iodine, and sodium bicarbonate with late-stage cancer patients, we see things that mainstream oncologists don't. This chapter is about magnesium massage, about how to employ one of these super nutritional medicines in the most comforting way possible. Magnesium massage is the type of treatment that Cleopatra would have enjoyed; it qualifies as a medical treatment for kings and queens that can be employed by anyone in their own home if they have a loved one with caring and

willing hands, or if they have access to a professional massage therapist.

Many people needlessly suffer pain

because they don't get enough magnesium.

Dr. Mildred Seelig

When patients are facing a serious illness, they need relief—

relief from pain, fatigue, nausea, loss of appetite, and shortness of breath, as well as relief from stress. Doctors often think that palliative or hospice care needs to focus on improving patients' ability to tolerate aggressive medical treatments. But patients themselves feel the need for support to be able to carry on with everyday life; they need to get their life back on some level that makes them feel that life is worth living. In short, they want to feel better. Nothing will make a person feel better than magnesium massage and that is why I recommend it universally even to patients at death's door.

Study after study demonstrates that for all mammals, receiving touch that is pleasurable, safe and appropriate reduces sickness, depression and aggressive behaviors.

Dr. Ben Benjamin

There are many ways to calm a person, many healing and medical treatments that can reduce stress, reduce sensory overload, slow the heart, and help a person center, and nothing does this better than touch. The most beautiful forms of touch are healing techniques and this is what professional massage therapists' true aim is, to heal through touch. Many studies have demonstrated that receiving touch that is pleasurable, safe, and appropriate reduces sickness, depression, and aggressive behaviors. Thus massage has its application in both therapy and medicine.

Skin hunger is a relatively new term that has been applied to the emotional response engendered by the loss of touch in our society. During World War II babies in orphanages failed to thrive and even died when deprived of human contact. The hunger 20

for touch is a real human need. <sup>3275</sup> And though touch is physical, the need provides sustenance and anchoring for our emotional, mental and spiritual selves. This is totally true for babies and only slightly less so for adults even though they have gotten used to a world and life of cutaneous deprivation.

Clinically, the lack of touch leads to a host of emotional, physical, and developmental problems in young and old alike.

Research has shown that there are distinct biochemical differences between people who experience touch and those who are severely deprived of it. Today, not only patients but also the

medical establishment recognizes the importance of alternative therapies and particularly the importance of massage therapy in comprehensive cancer care. Massage, like most alternative cancer therapies, is most effective when used in conjunction with other treatments. Magnesium massage combines the transdermal application of magnesium chloride with any one of a variety of massage techniques, creating a potent medical treatment in its own right.

Cutaneous satisfaction is associated with enhanced learning, improved IQ, language acquisition, reading achievement, memory, general neonate development, preterm infant development, reduced self-mutilating behavior in the severely mentally retarded, expanded external awareness in autistic patients, improved geriatric health, decreased childhood clinginess and fears of exploring the environment, elimination of inappropriate self-stimulation and public masturbation behavior in children, and improved visual-spatial problem solving.

Hospitalized patients recover more rapidly from injury and physical or psychiatric illness with attention to touch needs.

Current thinking defines touch as the primary organizer (or, in the case of neglect and abuse, “disorganizer”) of normal human development when viewed at biological, psychological, and even social levels. A person’s sense of self apparently originates in body awareness, body functions, and body activities that center around the sense of touch.

Though I was trained to use my hands before using needles (acupuncture), it was not until I sat clinic with a Brazilian doctor who does five-day detox retreats—with very sick patients—

that I really learned to appreciate what massage can bring to the table in terms of realizing radically positive healing results.

Over half of his staff were trained massage therapists. Patients received two or three massages a day and it was simply amazing to see what this doctor could do in only five days.

Massage is unique in cancer therapy and has great application in hospice care because it is able to remedy feelings of isolation that many patients battling a difficult disease encounter. The experience of human contact is particularly important when facing a difficult diagnosis and massage can provide that unique experience to cancer patients, who often succumb to feelings of being overwhelmed by the nature of their diagnosis, family implications, and other difficulties associated with cancer treatments.

Patients undergoing chemotherapy often find that treatments that help them relax their mind and body will lessen side effects like nausea, restlessness, and fever.

Massage therapists have the great pleasure of seeing the profound relief that massage can provide to people undergoing intense treatments like chemo and radiation therapy. Helping people feel better satisfies on a deep level of human experience and there is simply not enough of this in the field of medicine. With our heart and hands working together we can reach directly into another person's being through the surface of their skin. We can touch someone very deeply and when we do, we are touched equally.

The laws of giving and receiving work perfectly in the world of touch! Now we are adding to the mix one of the most potent medicinals available in the world of medicine and applying it all over the body for transdermal absorption. Magnesium is absolutely essential for healthy living and when applied liberally onto the skin we find patients responding most wonderfully.

Magnesium applied directly to the skin alleviates chronic pain, muscle cramps, and in general, makes our job of opening up and softening muscles and connective tissue much easier. Magnesium is a potent vasodilator and smooth muscle relaxant. Dr. Linda Rapson, who specializes in treating chronic pain, believes that about 70 percent of her patients who complain of muscle pain, cramps, and fatigue are showing signs of magnesium deficiency.

“Virtually all of my patients improve when I put them on magnesium,” says Rapson.

There are many ways to calm a person, many healing and medical treatments that can reduce stress, reduce sensory overload, slow the heart and help a person center and nothing does this better than touch. The most beautiful forms of touch are healing techniques and this is what professional massage therapists’ true aim is—to heal through touch. The skin provides the best avenue into the body for many medicinals and drugs. When it comes to magnesium we have a method in our hands that is similar in effect to intravenous magnesium treatments that are used to save people’s lives in emergency rooms. We simply use the magnesium oil like we would massage oils, or create a special blend mixing essential oil or other massage oils together with the magnesium chloride, which is quite slippery even though there is no oil in the “magnesium oil.” With the simple application of this slightly oily solution on the skin, massage therapists can easily have their clients take up their magnesium to healthier levels.

Though giving magnesium by injection is the quickest way of restoring normal blood and tissue levels of magnesium, it is expensive and sometimes uncomfortable. Transdermal magnesium chloride therapy is inexpensive, safe, and a do-it-yourself-at-home technique that can easily replace uncomfortable injections in anything other than emergency room situations.

Massage therapists should be introducing their clients to the tremendous benefits of a magnesium massage and it is they who should suggest to their clients to start using it at home.

Transdermal application of magnesium is superior to the commonly recommended oral magnesium supplements where absorption is not

guaranteed. In magnesium chloride oil we have a potent natural substance that penetrates the cells with stunning results on cell biochemistry and when loving touch is added to the mix the results are heartwarming to say the least.

What a few can do with intravenous magnesium injections everyone can do with transdermal magnesium.

Transdermal administration of magnesium bypasses the liver and creates “tissue saturation,” the ability to get the nutrients where we want them, directly in the circulation where they can reach body tissues at high doses without loss. Combined with tissue manipulation that occurs during massage, the blood is also brought closer to the surface of the skin thus allowing faster absorption of magnesium chloride into the cells.

Transdermal mineral therapy with magnesium chloride is the most powerful and safe medical intervention we have for managing or caring for many of our patients’ needs. Magnesium oil is the perfect companion to a massage in any setting, fulfilling further the purposes of giving healing touch to patients.

### Universal Application

Magnesium deficiency may participate in the clinical pattern of aging—neuromuscular, cardiovascular and renal symptomatology.

Dr. Mildred Seelig postulated that magnesium deficiency increases morbidity and mortality. “Little attention has been paid to special magnesium needs of old people, to whether magnesium inadequacy might contribute to the aging process, or to whether magnesium supplementation might have any beneficial effects in 20

the aged.”<sup>3276</sup> It is widely researched and recognized that magnesium deficiency commonly occurs in critical illness and correlates with a higher mortality and worse clinical outcomes in 20

the intensive care unit (ICU). <sup>3277</sup>

Some of the principle causes of magnesium deficiency in aging and critical illnesses are gastrointestinal and renal losses. As we age, our kidneys lose their efficiency in regulation of magnesium. Magnesium absorption decreases with age. Around the age of 70 it becomes two-thirds of what it usually is at around the age of 30.

Transdermal magnesium chloride is highly effective in pain relief and for calming agitation, and it is easier to use when oral intake of food may become impaired in old age or disease. It is much easier to apply magnesium oil on the skin of an elderly person than it is to submit them to force-feeding of food, pills, or IV administration of drugs to compensate for losses.

Hopefully we will hear more about touch in medicine. There are actually many ways physicians can touch their patients. “High touch” (as opposed to or in addition to “high tech”) focuses less on using technology and more on things like spending time with patients, physician listening skills, and medical massage, which staff can be employed to do. Dr. Ezekiel Emanuel outlined a high touch approach to medicine that he claimed may be the foundation for fixing health care in the U.S. With the results I have seen with magnesium massage used in the context of a full natural allopathic medicine protocol, I would have to agree.

One mother of an autistic child reports having used a form of therapeutic healing touch for five months with noticeable results. “He now asks me for ‘touch’ when he can’t calm himself, or when he has a headache, or isn’t feeling well. He nearly always wants my hands placed on his forehead.” Touch in the form of massage, affection, hugs, cuddles, and plain pure tenderness diffuses emotional tension. It grounds the entire system and touches our souls. When a person has not been touched in a long while a simple and tender touch can send a person into a flood of tears for the heart feels the release of tension abruptly. Touch can be a communication of love and is a most powerful way to communicate empathy, friendship, approval, affirmation and love to another. Love matters in medicine but contemporary medicine in love with its technology and toxic drugs has forgotten this, forgotten that its patients are humans with human needs.

Healing and health systems like Reiki, Polarity and Quantum Touch basically have us touch a person without any movement at all of the hands. There is no pressure applied, no technique one has to learn like they teach in massage schools. It's just the pure application of touch. Though each system gives different instructions, the end effect is similar. Essentially a person simply puts their warm hands on certain areas of the body and just holds them there. Reiki is very popular now and is effective enough to get the attention of some medical people and hospitals that understand that it can help their patients through some trying moments.

If we define touch as love we can easily see why. Love is healing and loving touch is wonderfully healing. When we touch with love and the highest inner intentions, which are taught by these healing systems, positive healing energy is transmitted.

Something is passed on through the hands and what happens is often very beautiful. Scientifically we know that infrared is radiated out through the hands and this all by itself has its physiological effect.

1. More on Transdermal Magnesium Therapy Lately I have been having my massage therapist heat my magnesium oil and it feels wonderful, especially when the air temperature dips. It seems to penetrate faster and deeper. Heat enhances the transdermal delivery by increasing skin permeability, body fluid

circulation, blood vessel wall permeability, rate-limiting membrane permeability, and drug solubility. Diffusion through the skin is a temperature-dependent process, so raising the skin 20

temperature adds thermodynamic drive. <sup>3278</sup>

Many studies of transdermal and subcutaneous drug administration indicate that the total amount of drug absorbed and the consequent plasma drug concentrations increased during heat exposure. Heating prior to or during topical application of magnesium oil will dilate penetration pathways in the skin and increase kinetic energy and the movement of magnesium ions in the treated area. Heating the skin after the topical application of magnesium will also increase magnesium absorption into the vascular network,



enhancing the systemic delivery. Increases in temperature will enhance absorption through the skin by increasing skin permeability, rate-limiting membrane permeability, and magnesium solubility in solution. Heat induces vasodilation and acceleration of skin blood flow, which impacts absorption and distribution of magnesium to the systemic circulation. This also occurs in heated bath water to which magnesium has been added.

I have been massaging five of my clients up to three times a week with the magnesium gel for a month now. I found the oil is a little too potent for direct massage on many elderly clients with thin skin especially in light of thinners, etc. The magnesium gel is much better received. For nearly four weeks one of my 86-year-old clients has been receiving the gel on his legs arms shoulders and chest via massage three times per week only. Some of this client's maladies were: practically nonresponsive 90 percent of the time; difficulty walking; latter stages of retinal neuropathy; and was in consistent excruciating cervical pain.

Recently he has been walking to the bathroom unaided and started reading again for the first time in a year. My client has not complained for over a week about his neck. He converses much more, and is more responsive. These are not my observations only.

The home care nurses have all remarked upon the miraculous recovery he has made. I would love to take credit for it, but my massage has not changed. The only thing that has changed in my client's vast medical protocol and diet preparation ... is the Ancient Minerals magnesium gel. I am amazed. I have 28 years of massage therapy experience and so far what I am anecdotally observing regarding this magnesium gel is very impressive. I have been searching for a viable magnesium vector for my clients and now I have it.

Brian Hirsch, MA

The delivery of drugs transdermally (through the skin) provides several important advantages over traditional oral and intravenous delivery routes. Transdermally-delivered drugs avoid the risk and inconvenience of intravenous therapy, bypass the liver in terms of first-pass elimination, usually provide less

chance of an overdose or underdose, allow easy termination, and 20

permit both local and systemic treatment effects. <sup>3279</sup>

Many years ago I wrote a chapter called Detoxification Through the Skin ; we know how sweat, sauna, and clay create channels of elimination of chemicals and heavy metals from the body. The old saying goes here: whatever can go in can come out, and in fact we do find the skin very porous, allowing a river of substances in or out of the body.

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Dr. Norman Shealy <sup>3370</sup> conducted a study that showed transdermal absorption with magnesium chloride, and Dr. R. H. Waring <sup>331</sup> did the same for magnesium sulfate. Both doctors found that their test results sustained the view that transdermal application of magnesium salts was a safe and easy way to increase magnesium levels in the body. According to Daniel Reid, the Epsom salts some people take as a magnesium supplement contains magnesium sulfate, which is much more rapidly excreted through the kidneys than is magnesium chloride, and is therefore more difficult to assimilate. The effects of magnesium chloride last much longer in the body. Compounds are thought to transfer through the skin by a predictable system of passive diffusion, defined by Fick's Law <sup>332</sup> and the rate of permeation.

I have been a certified massage therapist for the past four years and operate my own private practice. Since opening my business, I have tried almost every massage lotion, oil, gel, cream, etc. out there and I've never found the "perfect" one... until now. I specialize in deep tissue massage so I was always finding that the products I purchased were either too oily or even too dry with not enough glide to help me perform at my optimal level. I started using Ancient Minerals magnesium gel for the last month on most all my

clients and the results have been fantastic. My clients love the fact that on top of receiving therapeutic work in the form of massage, they are also receiving magnesium transdermally. One of my clients has been suffering with fibromyalgia for the past year; she has come every week for the last month and she has never felt better. She can sleep through the night and her pain level has decreased drastically. Someone who came to me every week just to get through the following couple of days can now last the entire week feeling better... this means the world to her. I'm excited to see the clients that come into my office receive even more health benefits and improvements than from my bodywork alone.

Jennifer Rhodes, CMT

Dr. Gary Gordon wrote, "If you have compromised cell membranes or low ATP production for any reason, then the cell has trouble maintaining the normal gradient. This is because the usual gradient is 10,000 times more calcium outside of cells than inside; when this is compromised you will have increased intracellular calcium, which seems to always happen at the time of death. Whenever intracellular calcium is elevated, you have a

relative deficiency of magnesium, so whenever anyone is seriously ill, acute or chronic, part of their plan must be to restore magnesium, which is poorly absorbed through oral means."

Mg is basically the antidote to calcium. When there is not enough magnesium, calcium runs wild, constricting arteries and making the body more rigid.

Many things affect magnesium absorption from the gut no matter what form of oral supplement is used, and this seriously compromises oral administration in medical treatment. Most drugs will adversely affect how magnesium taken orally is absorbed or how quickly it will be excreted. Since oral supplementation is touch-and-go in terms of retention, transdermal magnesium therapy becomes crucial to the allopath, the naturopath, and everyone in between.

"When people are ill and faced with magnesium deficiency and poor digestion, what do you think the odds are of fixing that problem with oral

magnesium supplementation and digestive enzymes alone?”

asks Dr. Ronald Hoffman. Mildred Seelig, Ph.D., renowned researcher of magnesium, predicts it would take six months to normalize magnesium levels in a woman who is magnesium deficient with oral supplementation. In his clinic Dr. Hoffman carefully measures magnesium and found that many patients with low magnesium who take just oral supplements do not normalize. The bottom line is that transdermal magnesium therapy speeds up the process of nutrient repletion in much the same way as intravenous methods. Like intravenous, transdermal application of magnesium can deliver higher doses of this key mineral to the cells.

There is no replacement for magnesium—no getting around deficiencies—just as there is no getting around a lack of oil in the engine of one’s car. The correction of magnesium deficit should be considered first in clinical practice. In summary, magnesium is a safe and simple intervention and should be the first thing we recommend to our patients in most clinical situations .

Application methods for transdermal magnesium therapy: Body spray: Simply spray all over the body after a bath or a shower, before bedtime or anytime. If the salt solution is too strong making the skin feel uncomfortable, dilute it with water in a 1:1 ratio.

Massage: Massage into the body 2-3 times a week. With the added benefit of a massage that softens and opens the skin, magnesium is absorbed even more readily, resulting in ultimate relaxation.

Magnesium massage is a treatment fit for a queen, for Cleopatra herself.

Body rub: Same as a massage, only done more quickly.

Bath: Use 1-3 times a week. The most luxurious and relaxing experience. Use several cups to several pounds of magnesium bath flakes in very warm water before bedtime for ultimate relaxation, relief of aches, pains, to promote sleep, replenish magnesium levels.

Foot bath: Used daily, it will improve circulation in the legs and help heal ulcers, as well as replenish magnesium levels through the feet.

Compress: One of the best ways to use magnesium chloride transdermally is in a compress— either hot or cold , depending on the condition. For inflammations and recent injuries where tissues are painful, hot and swollen, use a cool compress . To keep it cool, use an ice pack to apply on top of the soaked cloth. For chronic nagging aches, muscle tension, or back pain, use warm to hot magnesium compresses. A warm magnesium chloride compress applied on the forehead and the back of the neck and head will help relieve a tension headache and a migraine . The same compress will relieve aching muscles after strenuous exercise. Use locally on affected areas, such as legs, joints, etc. Use one part magnesium oil or flakes to 3-4 parts water or even use pure magnesium oil. Soak a cloth, apply on the area, wrap around with a cling film and then with a warm scarf. Leave on for 1-3 hours or even overnight.

Gargle, mouthwash: Mix with warm water (1:3 ratio), gargle or rinse mouth in cases of an infection. When used in full strength in the mouth we strengthen both teeth and gums.

Vaginal douche: Mix with water as above. Use for thrush or other minor infections with sodium bicarbonate.

Body wraps: Use in body wraps to relieve aches, pains, stress, or to boost circulation or metabolism.

Many parents of autistic children have already discovered the great power and grace of giving their children strong magnesium baths:

My daughter has autism, and she is now 12 years old. We recently tried the Ancient Minerals Magnesium Bath Flakes—we used it when we were out of town for a family wedding, hoping it would keep her calm and able to handle all of the new people, places etc...

I have never seen her behave so well as she did at that wedding.

A child who usually shies away from crowds was actually dancing in a room full of people. For me the night was flooded with compliments on how fantastic she looked (normal even!). But I know I must give the credit for that day to the magnesium bath we gave her the night before—she has never been so calm and relaxed!

Thank you for making such a special day for our family enjoyable to everyone!

Amy Perry and Family

Medical marijuana growers and users will want to know of the extra healing horsepower that comes from feeding their plants with magnesium chloride. Mieko Hester Perez has an autistic son who has shown enormous improvement since beginning medical marijuana a year ago; she recently added magnesium to both his baths and to his marijuana plants, and quickly afterward he began to utter his first words.

And for sensitive children, adults, and women interested in beauty applications there is now Ancient Minerals magnesium lotion, which is a smooth, quickly absorbed emulsion of magnesium chloride in a skin-nourishing base of certified organic oils.

Formulated for even the most sensitive individuals, this lotion offers a gentler concentration of magnesium chloride than magnesium oil or gel products. Rich in plant moisturizers, including coconut oil and shea butter, this lotion soothes and hydrates without leaving your skin feeling waxy or greasy. It feels silky, goes on really nice, and feels great! It heals the skin, is good for acne, psoriasis, and eczema as it enhances the natural beauty of the skin.

29 . Nebulizing Magnesium & Other Medicinals Nebulization and transdermal medicinal baths are prime therapeutic options for medication administration for children.

Sometimes very sick people or even animals with a lung ailment do better when taking drugs by nebulization as opposed to orally, because then the

embattled system doesn't need to go through breaking down the medications in the stomach and then delivering them to the lungs through the bloodstream. With nebulization, medicines get sprayed directly onto the lung tissues where they can most easily be absorbed locally by the lung and bronchial cells.

Dr. Frank Shallenberger says, "A nebulizer is able to convert a liquid into tiny bubbles that are so tiny that they can only be seen under a microscope. When these bubbles come out of the nebulizer, they are so small that they look just like smoke. And that's the magic of a nebulizer. The bubbles are so small that they can be inhaled deep down into the deepest regions of the lungs without any discomfort or irritation. It's a great way for asthmatics to get the medication they need to open up their lungs."

Few practitioners consider the systemic effects of nebulizers.

When we hear from patients using nebulizers with pharmaceuticals that it makes them feel the side effects just as badly as when the doctors were giving the same drug intravenously in the

hospital, we are actually hearing that the medicines are not only being delivered to the lungs but also being delivered directly into the bloodstream and systemically into the rest of the body.

This is very important to understand and appreciate because it opens a wonderful delivery system that is important for certain populations like infants, children, intensive care patients, and to all those who are trying to care for themselves or loved ones at home. And that's when Dr. Shallenberger thought, "Why not use the nebulizer delivery system to deliver treatments not just to the lungs but to the whole body?"

Most of the published research about nebulization is on standard usages like asthma but this delivery system can be used to treat lung cancer, pneumonia, tuberculosis, as well as the influenza, chemical poisoning, and actually any syndrome requiring the administration of a medicinal. For pediatricians and parents nebulizers are a godsend because our babies cannot pop pills and we don't really want to be sticking needles in them every day.

Transdermal medicine offers the most to the world of pediatrics with the administration of medicines through their baths and their breathing.

The great strength of nebulizers though is their capability of delivering medications and moisture directly to the tracheobronchial tree. Contrary to other treatment options, higher concentrations in respiratory secretions can be achieved with aerosol therapy. With the use of this localized delivery system, effective antimicrobials can have a direct effect on surface organisms in the bronchial system.

Nebulization thins secretions and mucus making it easier to expel pulmonary secretions.

Nebulization makes coughing easier while lessening the need to cough.

Nebulization keeps your windpipe and trachea lining and stoma moist and healthy.

Nebulization moistens the air that goes into your lungs.

Nebulization hydrates and moisturizes your nasal passages, mouth and throat.

Nebulizers are good for young children, people who have trouble using metered dose inhalers, and people who have severe asthma.

Within 10-15 minutes, the medication is used up and symptoms are gone, or prevented for 6-8 hours. Even babies can breathe the mist and nebulizer treatments are fast becoming pediatrician-approved alternatives to over-prescribed antibiotics.

Several devices are available to create the drug aerosol particles. These include jet nebulizers, ultrasonic nebulizers,

metered-dose inhalers, and dry powder inhalers through which particles can reach the upper and lower respiratory tracts and be quickly absorbed into the bloodstream.



Aerosolized drugs have several advantages including quick onset of action and low incidence of systemic adverse effects.<sup>333</sup>

Delivery of aerosolized medications typically does not cause pain to the patient, and it is frequently a more convenient method of drug delivery. Studies show that the device used really doesn't matter, as long as it's used properly. All methods work just as

well when the correct technique is used.<sup>3374</sup> Nebulizing is generally carried out for 10 to 20 to 30 minutes each time, and for best results, one may need to nebulize up to five times a day.

Transdermal medicine delivers medications to the exact site of injury, pain or disease.

Transdermal medicine applied through a nebulizer is ideal for direct treatment to the lungs. Transdermal methods of delivery are increasingly being used because they allow the absorption of medicine directly through the skin and in this case we conceptualize the lungs as an inner skin. Such treatments ensure that medications reach the site of needed action directly

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bypassing the stomach and liver meaning a much greater percentage of the active ingredient gets to target tissues.

At the Ohio State University Medical Center, pharmacists, respiratory therapists, and pulmonologists endorse what they call off-label nebulization. Off-label nebulization is a rapidly growing area of patient care and in time new research and practical experience will bring us much more information on how magnesium and other agents like sodium bicarbonate, iodine, peroxide and glutathione can be administered directly into the lungs for many difficult-to-treat conditions. Even DMSO has been used in veterinarian medicine, and naturopaths have used tea tree oil from Australia, which is used topically as fungicide antiseptic and germicide. Eucalyptus oil has also been used forever because it is a known bronchial-dilator.

Nebulized Magnesium

Magnesium chloride oil should be nebulized as an isotonic solution—delivering 7.5 g magnesium chloride per 100 ml of distilled water—closely equal to 3.5 tsp of magnesium oil per 3

oz distilled water. Nebulization of magnesium is an alternative method of treatment for patients with pulmonary problems or infections, or for those undergoing bronchoscopy. Magnesium nebulized directly into the lungs offers all the same positive therapeutic effects that other types of administration methods do but concentrates the effects in the lung and bronchial tissues.

Nebulized inhaled magnesium sulfate in addition to 2-agonist in the treatment of an acute asthma exacerbation appears to have benefits with respect to improved pulmonary function in patients with severe asthma. Heterogeneity between trials included in this 20

review precludes a more definitive conclusion. <sup>3375</sup> Nebulized 20

magnesium is well tolerated without any adverse effects. <sup>3376</sup>

Currently, the most widely accepted treatments for asthma include  $\beta_2$ -adrenergic agonists and corticosteroids. The search for treatment alternatives for bronchoconstriction in acute asthma 20

has led to the use of nebulized magnesium. <sup>3377</sup> Magnesium has been associated with cellular homeostasis and frequently acts as a cofactor in enzymatic reactions. It has also been suggested that magnesium acts as a smooth muscle relaxant by interfering with calcium uptake. Research also suggests that magnesium may have a counteracting effect against bronchoconstricting agents such as sodium metabisulfite, methacholine, and histamine. Research into nebulized magnesium focuses on treating asthma and the potential to counteract bronchoconstricting agents.

A randomized, double-blind, controlled clinical study compared nebulized magnesium sulfate with nebulized albuterol in 33

patients with asthma (ages 12-60 years).<sup>3378</sup> The study concluded that the serial doses of nebulized magnesium sulfate had bronchodilatory effects similar to those noted with nebulized albuterol.

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Nannini et al.<sup>3379</sup> examined magnesium sulfate as a vehicle for nebulized albuterol in treating acute asthma. The authors concluded that when nebulized magnesium and albuterol were used together, a higher peak flow could be achieved in comparison to albuterol plus 0.9 percent sodium chloride. The improvements could be seen within 10 minutes and lasted at least 20 minutes, and patients suffering from the most severe airway obstruction had a greater response to the combined treatment. Another study investigated the interactions between magnesium sulfate and sodium metabisulfite, a common preservative in food and drugs.

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<sup>374</sup> 70 The investigators concluded that magnesium helped to minimize the bronchoconstriction effects from sodium metabisulfite.

These studies strongly suggest that nebulized magnesium would be effective for safe treatment of acute exacerbations of asthma, either as a sole agent or in combination with other medications.

For this application I recommend only the purest magnesium chloride. Even the pharmaceutical and higher grades have heavy metal contamination so are not suitable.

### Nebulized Bicarbonate

The bronchial secretions during attack of bronchial asthma are acidic and the acidity imparts stickiness to the secretions and moreover there is high level of neuraminic acid, which possibly correlates with the stickiness. Thus sodium bicarbonate is an

excellent choice for nebulization offering its powerful and instant pH-changing effects. Dr. Tullio Simoncini recommends aerosol use of

bicarbonate for lung and bronchial adenocarcinoma.

He recommends putting one soup spoon sodium bicarbonate in one-half liter water and inhaling it with a fast inhaler in half an hour; six days on, six days off when in IV break phases.

Dr. Lewis Nelson, a specialist in emergency medicine says,

“Nebulized sodium bicarbonate has been shown to provide symptomatic relief in patients exposed to chlorine, and it is probably useful with all irritant gases that liberate acid.

Through a neutralization reaction, the damaging effects of the acids are limited. Nebulized sodium bicarbonate should be used in concentrations of less than two percent (which generally means about a 4:1 dilution of standard eight percent sodium 20

bicarbonate).”<sup>3741</sup>

### Nebulized Peroxide

Hydrogen peroxide has been used for decades to conquer viral infections by thousands of doctors in thousands of patients all over the world. Hydrogen peroxide consists of a water molecule (H<sub>2</sub>O) with an extra oxygen atom (H<sub>2</sub>O<sub>2</sub>). It is the extra oxygen atom that makes it so deadly for viruses. Nebulization is a new way of administering hydrogen peroxide therapy that is almost as effective as the IV. And better than the IV method, this new treatment can be done at home, and is very inexpensive.

Nebulized peroxide is an efficient route of getting this oxygen utilizing catalyst into the body via the rich network of blood vessels in the lungs. This is not as strong a treatment as IV

peroxide but it comes close. Caution: Do not mix your own peroxide; this can be dangerous. If you feel bad after the peroxide, with flu-like symptoms, headache, fever, diarrhea, fatigue, etc., this is too strong a catalytic stimulation with peroxide. Consult your physician before using peroxide in a nebulizer.

“When my wife developed the first symptoms of flu, instead of immediately plugging her into a hydrogen peroxide IV, I had her use the nebulizer for ten minutes every waking hour. Using the nebulizer treatment, she was able to get rid of the flu within 72

hours. I knew I was on to something, because IV hydrogen peroxide doesn’t work much better than that. So I bought a dozen nebulizers and began offering the treatment to my patients.

“Since then I have treated hundreds of cases of colds, flus, sinusitis, and bronchitis all with the same great results. And I found that the nebulizer treatments actually have an advantage over the IV therapy that I hadn’t considered at first. And that is, that not only is the hydrogen peroxide being disseminated into the entire body through the lungs, it is also going directly to the areas of the body that are most affected by viruses—the sinuses, throat, bronchial tract, and lungs.”

Dr. Shallenberger

## Nebulized Iodine

In some countries nebulizers are given to people by prescription only because they give a person direct access to the bloodstream and this is an indication that this is serious medicine we are dealing with, so caution is advised. With nebulizers we in part get the same effect as with injections, medications quickly diffuse directly into the bloodstream. Thus a nebulizer holds the capacity to save lives.

When it comes to using iodine in a nebulizer special caution is needed. The choice of iodine is important because putting in potassium, which is found in Lugol’s iodine, is dangerous.

Potassium chloride, another salt of potassium, is used for lethal injection so I recommend only Nascent Iodine. Nebulization with iodine offers an extremely strong therapy that can clear the lungs quite rapidly of infections. Therapeutic concentrations can be increased for desired effect but it is recommended that dosages start at the low end unless there is an emergency situation. I would start my first iodine treatment with a weak solution, 3-5

drops and slowly increase to 10 drops or more, closely monitoring the experience. As long as the patient displays no discomfort or side effects, concentration can be increased strongly, especially when in a life-threatening situation. One should expect much quicker and more dramatic results with iodine than with H<sub>2</sub>O<sub>2</sub>.

## Nebulized Glutathione

Glutathione has many profound roles in the body. One role is to enable the liver to remove toxins, medications and other substances from the body. Without it, these substances cannot be removed properly. One puts a special small daily amount of glutathione in a nebulizer, which will facilitate toxin removal and possibly tissue repair. The glutathione level of the epithelial lining fluid is decreased in severe inflammatory lung diseases including cases with cystic fibrosis.

Glutathione in the epithelial lining fluid (ELF) of the lower respiratory tract is thought to be the first line of defense against oxidative stress. Inhalation (nebulized or aerosolized) is the only known method that increases GSH's levels in the ELF.

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<sup>3742</sup>

Dr. Michelle Alpert, D.O. says, "Because oral glutathione is not well absorbed, I have also begun to experiment with nebulized glutathione, which patients can take at home between detox drips.

According to a study in *Alternative Medicine Review* in 2000, nebulized glutathione has had remarkable success in emphysema and other lung disorders such as asthma and bronchitis. It appears that inhalation may have a systemic effect. Some patients are 20

having even greater success with this combination." <sup>3743</sup>

In a case of a 95-year-old man with an acute respiratory crisis secondary to emphysema and apparent bronchial infection, treatment with nebulized

glutathione led to a rapid resolution of the crisis as well as a marked improvement in the chronic course of the disease. This treatment has since been used for a number of patients with emphysema. The safety and bioavailability of this method of delivery have been established in human studies.

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<sup>374</sup> 74

Different people taking nebulized glutathione often have very different reactions. One person may tolerate nebulized glutathione well but not get the desired effect, another may have side effects or adverse reactions that make nebulized glutathione intolerable, and yet another may get the desired effect with no 20 20

side effects. <sup>374</sup> 75

## General Instructions

Procedure: The basic aim of a nebulizer is to facilitate a faster and more effective absorption of the medicine. This is achieved by breaking down the liquid medicine into very fine particles, which is inhaled by the patient. The first step is to add the liquid medicine to the cup attached to the device. It is important to understand that these devices accept medicine in the liquid form only, and medicine should be added at the time of usage and not before that. If the doctor has prescribed more than one medicine for nebulization, make sure if they can be mixed together or determine whether or not they should be taken separately. Once the medicine is put in the cup, close the cup and connect its tube to the air compressor. Turn the compressor on and when the compressed air reaches the nebulizer cup, it will vaporize the medicine, creating a mist that the patient inhales through either a mouthpiece or a mask.

Instructions using mouthpiece: Place the mouthpiece in your mouth and breathe in slowly. At full inhalation, hold your breath for a 2-4 count to allow absorption in the lungs. If you are treating colds or sinus problems, you can also alternate breathing through your nose.

Take deep breaths and inhale the vapor completely. Tap the cup regularly to ensure the right dispensation of medicine and don't remove the mask until the medicine is used up completely. It will take about 10-20 minutes to finish nebulization depending on what type of medicinal is used.

Special Note: I have even heard of DMSO being used in combination with other medicinals just as it would be used topically on the skin.

### Online Purchasing Information

<http://www.outpatientmd.com/Nebulizers/>

<http://www.outpatientmd.com/prodDetails.cfm?itemID=1229>

This second link is for a 30-dollar nebulizer with a five-year guarantee.

### 1. Medical Miracles from the Sea

Contemporary medicine shuns natural medicines even though they are safer and better acting than pharmaceuticals. Mother earth provides its raw healing power through clays that can be taken orally to clean and heal the alimentary canal. Clay can also be used in baths as well as poultices and packs to draw chemicals and heavy metals out through the skin. But the secrets of the sea offer even more profound and versatile answers—miracles still waiting to be fully discovered by medical science.

One of Hawaii's fastest-growing exports is based on a commodity the state is soaking in: seawater. Super-cold water sucked up from thousands of feet below the Pacific Ocean's surface is being marketed as healthy, pure, mineral-rich drinking water. Japanese consumers are paying top dollar for desalinated Hawaiian deep-sea seawater being marketed as a dietary supplement that aids in weight loss, stress reduction, skin tone, and digestion.

Three of the most basic substances in my Natural Allopathic Protocol are found in seawater. Magnesium chloride, iodine, and bicarbonate are concentrated medicines used in emergency rooms are all sea sourced medical miracles that modern medicine underutilizes to its interminable



shame. The magnesium oil and the bath flakes I recommend are from a sea that was trapped underground 250 million years ago, which has turned into an immense sea of ultrapure magnesium chloride. Though iodine and sodium bicarbonate are land sourced, they still mirror properties of the sea. Emergency rooms and intensive care wards would be lost without these medicines. Magnesium chloride and sodium bicarbonate are non-pharmaceutical, non-toxic, concentrated nutritional medicines.

Now my attention is turning to the healing properties of whole seawater. Seawater contains every mineral and trace mineral known in organic form and in the proper ratios needed by human tissues.

The seawater offered by Quinton Plasma is a magnificent example of a perfect medicine because it provides not only every mineral imaginable but also has the unique properties found in the origins of life. All of the cells in our body live in the original aquatic conditions found on our planet and it is the pollution or shifts in the basic nature or “terrain” in the cellular aquatic environment that spells disease. Flooding the body with the “original terrain” is medicine at its best. (See the results of this new research of mine in my book, *The Waters of Life* .)

For over a hundred years, doctors in France have seen this process and have been stunned with the results of both oral and

intravenous methods of application. So profound is this effect that European doctors have used Quinton Plasma during pregnancy and have seen that treated women brought into the world infants better developed than normal, devoid of congenital defects even though their case histories indicated grave hereditary challenges. Subcutaneous treatments were applied to pregnant women with tuberculosis and syphilis, greatly diminishing 20 20

stillbirths; athrepsia <sup>374</sup> 76 and atrophy were avoided with elevated birth weights seen.

Dr. René Quinton, French biologist/physiologist, proved that seawater, properly formulated and under certain conditions, is virtually identical to mammalian blood plasma. With the assistance of many eminent physicians,

he successfully used seawater as a healing agent on thousands of patients in France 20 20

and Egypt in the early 1900s. <sup>374 77</sup> Quinton was a medical genius who wrote elegantly. “An organism consisting of living cells, all in intimate contact with a liquid that we have named ‘their vital element’ (milieu vital)—that liquid is a marine liquid. In all cases where such a culture liquid is compromised in one way or another, the result is chemical or microbial poisoning, insufficiency of the eliminative organs, failure of certain nutrient supplies, etc.”

During World War II, Navy doctors would use Quinton Marine Plasma for blood transfusions when blood supplies ran out and many lives were saved.

The United States Navy sustained much of Dr. Quinton’s work when they turned to seawater during the Second World War and used it instead of blood plasma to save their sailors’ lives when medical supplies ran out. Life on this planet was born in seawater and we find that we humans still carry around the properties of the sea in our blood, which maintains many of seawater’s inherent properties. In 1904, Quinton published his treatise, *Seawater, Organic Matrix*. This book demonstrated that human blood plasma and extra-cellular fluids were virtually identical in mineral salt makeup to isotonic marine plasma. Everything in the human body responds to the condition of our extra-cellular fluid—the

“sea aquarium” or “marine terrain” as Quinton referred to it.

When we restore the quality of this internal sea aquarium to its original marine inheritance, every cell, organ, and tissue begins to respond and function as it was intended. Quinton is the father of the medical use of seawater with over a hundred years of research and clinical experience standing in testimony to this most basic of all medicines. Quinton used diluted seawater concentrations for treating children and for use in transfusions 20 20

instead of whole-blood plasma. <sup>374 78</sup> One hundred years later we find that many doctors in the world are using Quinton Plasma in their clinical practices.

Many disease conditions responded to injections of the diluted ocean water—a true “marine plasma” can re-mineralize a sick body, normalize the pH (acid-alkali) level, and balance the electrolytes, thereby correcting the underlying cause of disease conditions by regenerating the “internal terrain.”

Interrelationships of minerals and trace minerals in their non-soluble form are not nearly as effective as those of soluble minerals. Minerals found in seawater products are completely soluble.

Evaporated seawater eventually ends up as magnesium chloride. It is the brine that forms on top of the salt that solidifies beneath it.

Dr. Jacques de Langre, in his book, *Seasalt's Hidden Powers*, states that properly-sunshine-preserved sea salt is the difference between life and death, health and illness, social sanity and planetary panic, and its elements are vital for proper body functions. In addition, he states that the pure, natural, hand-harvested ocean salt helps to maintain life, neutralize toxins and detrimental bacteria, and enhance all our organic functioning.

There is a world of difference between salt that still has its mineral content and the salt that 99 percent of the world's population consumes. Normal marine salt is 99.97 percent sodium chloride meaning all the wonderful healing minerals have been separated from the salt leaving an unbalanced substance that sickens people over the long term. There are different salts like Real Salt or Celtic Salt that maintain the full properties of the sea.

The dynamic equilibrium that takes place with liquid ionic minerals and trace minerals in healthy blood plasma and lymphatic and cellular fluids is the same found in seawater. The molecular mystery of cell life and human blood plasma is mirrored in the mineral composition of seawater. French scientist Dr. Alexis Carrel kept a chicken heart alive for over 27 years by keeping the pulsating heart in a solution of isotonic seawater.

The soluble minerals in seawater:

Act as ionized conductors of the body's electrical current, which is necessary for all bodily functions.

Act as catalysts and activators of other nutrients including vitamins.

Are the building blocks of enzymes, hormones and other natural body chemicals used by the body to perform specific functions.

Have an equalizing and balancing effect; body fluids, fluid pressures, and pH levels are balanced by minerals.

Are essential in digestion and absorption of nutrients by our body.

Seawater for Sale: Only \$16.75 an Ounce

The Japanese are pumping it up from deep waters in Hawaii, taking the salt out, and selling it to populations living half an ocean away. They seem to know something that their western counterparts don't. The water is pumped from a Natural Energy Laboratory of Hawaii Authority (NELHA) pipeline that extends 2,000 feet down, with a new pipeline planned to go down to 3,000 feet. Besides the startup costs and the expensive desalination process, the companies will spend millions on shipping tons of water to Asia.

So valuable do they find ocean seawater that they are willing to pay a cool \$2,144 a gallon for a concentrate of sea minerals taken from the deep sea. Two-ounce bottles of Hawaii Deep Marine's Kona Nigari seawater mineral concentrate (to mix with regular water) was said to sell for \$33.50 at the Key of Life store in the Royal Hawaiian Shopping Center, reported USA Today 20 20

.<sup>374</sup> 79

Koyo USA Corp. is producing more than 200,000 bottles a day of bottled water from this deep sea Hawaiian water and the company says it can't keep up with demand in Japan, where it sells 1.5

liter bottles of its MaHaLo brand water for \$4 to \$6 each.

Hundreds of millions of dollars are being invested and hundreds of jobs have been created in this growing industry. Former Governor Linda Lingle issued official Hawaii deep-sea seawater certificates and the state charges

three cents a bottle to use a logo to distinguish Hawaiian seawater from other sources.

Mineral water, which is more expensive than gas these days, is selling like hotcakes in Korea. According to the Korea Customs Service, the 2003 import volume of mineral water recorded 1.916

million U.S. dollars, a 16.8 percent increase from the previous year at 1.641 million U.S. dollars. It is a triple increase from 629,000 U.S. dollars in 2002. The top selling product is deep water drawn up at 4,000 m, which is known to be rich in minerals.

“Marine Power” from Japan is sold at 75,000 won per liter, which is about 70 dollars.

This book is a testimony to the many reasons people are utilizing the healing power of the sea. Whether they are suffering from some debilitating chronic disease, have the flu, are pregnant, or are at death’s door in hospice care, magnesium is the substance that will provide safety, comfort, and healing. The future of medicine is found in the elements of the sea, which can be broken down and concentrated as in the case of magnesium, bicarbonate, and iodine. These concentrated medicines are fast-acting and that is why we find them in emergency rooms and intensive care wards.

Whole seawater (Quinton Plasma) is slower acting but provides even deeper healing as it renews the fluids both inside and outside the cells. Seawater resets the basic parameters of life allowing rejuvenation and health to occur.

31 . Magnesium Chloride Product Analysis Magnesium is nothing short of a miracle mineral in its healing effect on a wide range of diseases as well as in its ability to rejuvenate the aging body.

Magnesium chloride is one of the best-kept secrets, not only in naturopathic medicine but also in the world of allopathic medicine where it is used in emergency rooms to save lives.

Magnesium chloride has a dramatic effect on cell life and is vastly safer to use than aspirin. Why is magnesium chloride so effective in so many medical situations? “Magnesium is necessary for the normal function of over 300 enzyme systems, for muscle relaxation, immune function, cardiac function, clotting, nerve conduction, etc. Indeed I cannot think of a bodily department in which magnesium is not essential. It prevents heart disease, cancer, high blood pressure, kidney stones, and improves energy, sleep, etc.” reports Dr. Sara Mayhill.

Those who consumed the most magnesium had about a 31 percent <sup>20</sup> <sup>20</sup> reduced risk of developing metabolic syndrome. <sup>375</sup> <sup>70</sup>

Metabolic syndrome is a collection of conditions, including high blood pressure, high triglycerides, lower levels of HDL or good cholesterol, higher waist circumference, and higher than normal blood sugar. People with metabolic syndrome are at significant risk for heart disease and diabetes.

The biggest benefit of topical/transdermal magnesium chloride administration is that the intestines are not adversely impacted by large doses of oral magnesium.

Magnesium chloride is a versatile medicine we can all put in our medicine cabinets. It boosts almost all aspects of cell physiology and can be used orally, intravenously, and transdermally. Magnesium chloride treatments address systemic nutritional deficiencies, act to improve the function of our cells and immune system, and help protect cells from oxidative damage. It's a systemic medicine as well as a local one bringing new life and energy to the cells wherever it is applied topically. Minerals like magnesium help with everyday body processes, reduce risk of certain cancers, strengthen muscles and tissues, and help develop organs and tissues as well as keeping them from deteriorating.

Magnesium chloride is a potent substance that penetrates the cells with stunning result on cell biochemistry.

$\text{Mg}(\text{OH})_2(\text{s}) + 2 \text{HCl} \rightarrow \text{MgCl}_2(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$  What is of concern to us all is the relative purity or level relative level of contamination. My official position on the pharmaceutical stuff, which often contains 25 times the heavy metal pollution than natural seawater evaporation solutions, is that it's a thousand times better than nothing. Often in many countries it is the only magnesium chloride product one can find.

My complaint against these pharmaceutical materials is that they have high levels of lead and other undesirable elements. They do not feel the same on the skin as natural solutions, but to do without when in need of magnesium supplementation is like not breathing air when living on earth because of the pollution.

Oral magnesium chloride is well tolerated and gets absorbed very quickly and is inexpensive. Magnesium chloride hexahydrate can be purchased from most chemical supply houses without a prescription.

A typical magnesium chloride hexahydrate solution might have 20

20

about ten parts per million of heavy metals. <sup>3751</sup>, <sup>3752</sup> Some synthetic products only have about 5 ml/kilo meaning only five 20

parts per million of heavy metals. <sup>3753</sup> In general these industrial-made magnesium chloride products are inexpensive when purchased in bulk and can be dumped in your bathtub for relaxation and medical treatment. Most technical-grade hexahydrate solutions usually maintain in solution about 25

percent magnesium chloride whereas the natural brines are up at around 32 percent, sometimes topping out at 35 percent before we find magnesium chloride crystals forming at the bottom of the container.

Lead is a problem not only in children's toys and household plumbing but also in magnesium products. Jamieson™, Natural Sources Calcium Magnesium is not approved by Consumer Labs because it contains 1.9 mcg of lead per daily serving. Weil™, Andrew Weil, M.D. Balanced Cal-Mag is

also not approved by Consumer Labs because it contains 2.3 mcg of lead per daily 20 20

serving.<sup>375 74</sup>

Mercury is also a problem in some of the available magnesium products and it's a growing concern on earth today. There is at least one company selling magnesium chloride brine from the Great Salt Lake but federal scientists studying the lake have found some of the highest levels of mercury ever measured anywhere.

Concentrations of methylmercury, the element's most poisonous form, exceeded 25 nanograms per liter of water. Fish consumption warnings have been issued when there was just one nanogram per liter. "We thought we would find some high levels of

methylmercury," said David Naftz, the USGS (U.S. Geological Survey) research hydrologist who is heading the Great Salt Lake project, "but not some of the highest [the USGS] has ever found."

The deepest waters of the Great Salt Lake may contain even more toxic mercury than previously known. That's according to water tests done by Kennecott Utah Copper a few years ago, two years after samples that triggered alarms about mercury throughout 20 20

Utah.<sup>375 75</sup> The large surface area of the lake may collect a lot of mercury from atmospheric deposition. Once in the lake, sulfate-reducing bacteria that live in the deep brine layer may facilitate the creation of methylmercury. Preliminary analyses indicate that methylmercury levels in the deep brine layer of Utah's Great Salt Lake are among the highest ever measured by the 20 20

USGS.<sup>375 76</sup>

One needs to be seriously concerned about purchasing products coming from the Great Salt Lake and companies making claims about purity who have no documentation to prove support of their assertions. There are very few producers of transdermal magnesium products that actively test their



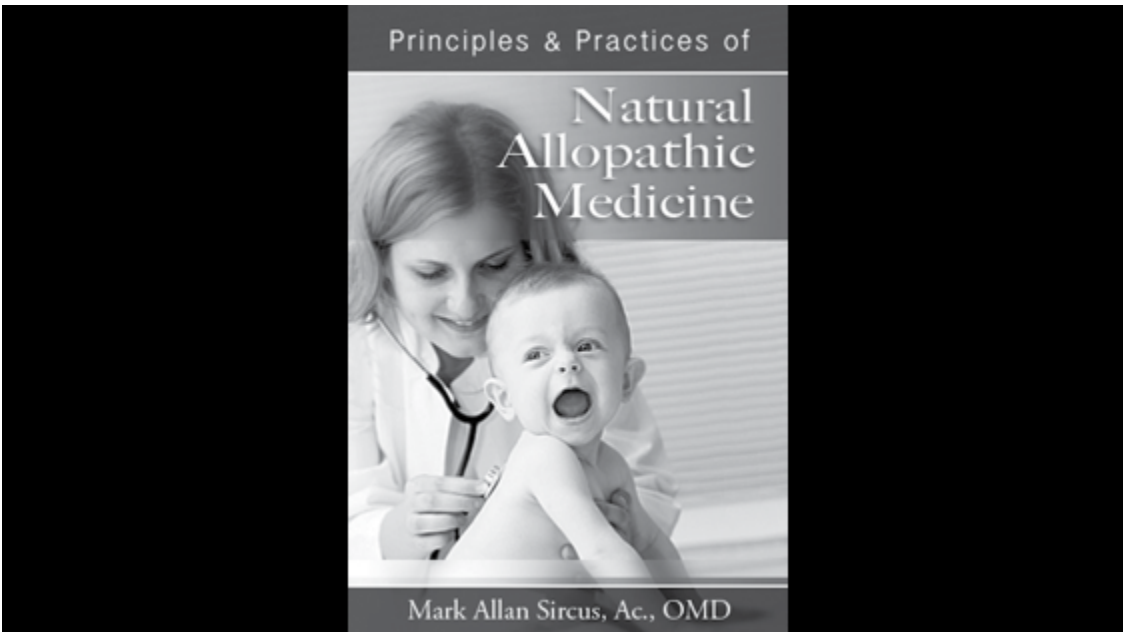
product with standardized labs tests, let alone disclose these tests to the public. It is not advisable to take someone's word on such matters.

Magnesium oil gathered by salt water evaporation has been our favorite magnesium chloride solution until now, but we found after a few years of experience that it was not pure enough for medical or health use. Certainly it could never be taken orally as the pharmaceutical stuff can be. Though it can be filtered fairly well, if it is bottled in a certified laboratory and bottling company it can still smell and sting when put on the skin. I now only recommend magnesium oil products that come from certified laboratories and bottling companies and even then do not suggest seawater magnesium oil from open and unprotected ponds.

For the very purest magnesium oil we now have to turn to Europe.

Deep underground is a 250-million-year-old inactive sea of magnesium chloride oil that has never been touched by modern day pollution and there is enough of it down there to last humanity hundreds of years. It is so pure that I use it diluted as a mouthwash and then swallow what is in my mouth for oral supplementation. It is ideal not only for oral intake but also seems to be better tolerated by the skin, even when used at full strength. This magnesium oil is called Ancient Minerals .

Special Note for Health Care Practitioners: In critical situations where heavy application is a must, one needs the confidence that patients will be able to tolerate without discomfort the application of the magnesium chloride all over the body. To have an emergency situation where a patient is in desperate need, we need the purest available.



Though the small amounts of mercury ( 0.004 mg/l as originally tested) in sea-derived magnesium chloride products are not threatening especially because of the larger selenium levels that are more than enough to bind and neutralize the mercury, the underground magnesium chloride oil provided by Ancient Minerals has tested as “undetectable” down to sensitivity thresholds of 2

parts per billion (2 ppb). Because of the great strength of the Euro currency and the greatly weakening dollar, this magnesium oil product will be more expensive meaning it probably will not be appropriate to use in bulk for baths. Thankfully, Ancient 20 20

Minerals <sup>375</sup> 77 also provides bath flakes from the same source that have made it much more affordable to the masses for taking medicinal magnesium baths.

To gaze on 64 ounces of it is to gaze on the purest, most powerful medicine obtainable anywhere in the world. Its pure healing power and versatility of use make it a non-option in every medicine cabinet and in every doctor’s dispensary. It certainly would be the product of choice for skin beauty care and for straight oral supplementation. Beauty and health are in reality highly related subjects. Rarely do we see an unhealthy person who is beautiful or a beautiful person who is grossly unhealthy. As we lose our

health our beauty is diminished by the diseases we fall victim to. In ancient China magnesium is called the beautiful metal and it will bring nothing but beauty to one's life, body, and skin.

As we saw in the preceding chapter, two-ounce bottles of Hawaii Deep Marine's Kona Nigari seawater mineral concentrate (to mix with regular water) sell for \$33.50 at the Key of Life store in 20 20

the Royal Hawaiian Shopping Center, reported USA Today .<sup>375 78</sup>

Ancient Minerals magnesium oil comes in at about \$3.75 per two fluid ounces, and it gets my vote for all-time purest, most powerful, useful medicinal substance in the world.

Lesser quality evaporated seawater magnesium oil would come in at an average of about \$1.60 for two ounces (when purchased by the gallon), but there are certain limits we have to put on contamination with heavy metals and other contaminants with any medicinal.

\*Special Note about "Pharmaceutical Grade" magnesium chloride products: Recently there have been several manufacturers of transdermal magnesium chloride products on the web, simply stating the purity of their product as "pharmaceutical grade."

Unfortunately, this is insufficient. It does not give us any real information or insight into the quality of the product. First and foremost, many of them cannot or will not supply laboratory proof to support their claim. Secondly, the standards for pharmaceutical grade magnesium chloride are too relaxed. A producer can refer to their magnesium chloride products as pharmaceutical grade provided that it does not contain more than 10 parts per million of heavy metals (mercury, cadmium, lead, etc.), which is definitely not considered to be a product suited for medical use.

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Nigari<sup>375 79</sup> is a related product from Japan that can be found in supermarkets and drugstores nationwide. Once only regarded as the additive that makes soymilk solidify into tofu, nigari is now considered

every bit as beneficial as the tofu itself. In general, there are two types of nigari. One is a powdered form principally composed of magnesium chloride ; the other—now widely available—is a liquid form derived from the water left after sea salt has been extracted from saline. It is rich in minerals such as magnesium chloride, potassium chloride, and sodium chloride.

In Japan, tofu has been a staple food for centuries, but due to the long-standing Government Monopoly in Salt Law, people were not free to make salt. As a result, nigari did not become readily available until 1997 when the law was repealed. Nigari really took off after “Omoikkiri Terebi” featured it in the spring of 2002, presenting it as being high in magnesium. Prior to spring 2002, it was thought of as nothing more than a coagulant for tofu. However, it all changed when a rumor started on Internet bulletin boards that nigari had some connection with the relief of hay fever symptoms, and the nigari dealers were swamped with product orders and questions about it.

There are many other excellent products high in magnesium content, one of special note is the Dead Sea salt. It is high in both magnesium and potassium and is good for strong mineral baths. One will not find that it replaces a high potency magnesium chloride but it is a healing agent in its own right.

There are actually many such salt and brine works, and salt is a huge subject in and of itself. Himalayan Crystal salts, Real Salt, and Celtic Sea Salt are some of the finest in the world and are worth their weight in gold.

Epsom salts are wonderful for many applications—you can put hundreds of pounds of it in an isolation chamber and easily float! These salts have soothing but limiting health and healing effects in comparison to magnesium chloride, which could never be put in great quantities in the water you bathe in. For some reason magnesium chloride is hugely more absorbable through transdermal means than magnesium sulfate (Epsom salt). Though magnesium sulfate is equally effective in the emergency room, saving cardiac arrest patients with ease, it does not come anywhere near to the level of medicinal potency of magnesium chloride in the transdermal world of application and approach.

The real value in Epsom salts is not the magnesium, which is not easily absorbed or retainable in that form. It's the sulfur and the best way to get sulfur into the body is with MSM or sodium thiosulfate.

Epsom salts are discussed further in the next chapter.

## 1. Chloride Vs. Sulfate Forms

All magnesium supplements have to be converted to magnesium chloride so, you might as well use the chloride form to begin with.

Though magnesium sulfate will save your life in emergency situations as quickly and easily as magnesium chloride, it is magnesium chloride that fills the bill best as a universal medicine. Magnesium sulfate is a close cousin whose effect, form, and toxicity demands it be used in special applications when the sulfur is needed and in terms of intravenous use is as effective as the chloride form.

Magnesium sulfate is a chemical compound containing magnesium and sulfate, with the formula  $\text{MgSO}_4$ . In its hydrated form the pH is 6.0 (5.5-7.0). It is often encountered as the heptahydrate,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , commonly called Epsom salts. Epsom salts have traditionally been used as a component of bath salts. According to Daniel Reid, author of *The Tao of Detox*, magnesium sulfate, commonly known as Epsom salts, is rapidly excreted through the kidneys and therefore difficult to assimilate. This would explain in part why the effects from Epsom salt baths do not last long and why you need more magnesium sulfate in a bath than magnesium chloride to get similar results. Magnesium chloride is easily assimilated and metabolized in the human body. However, Epsom salts are used specifically by parents of children with autism because of the sulfate, in which they are usually deficient.

Sulfur is crucial to the body and is wasted in the urine of autistic children.

For purposes of cellular detoxification and tissue purification, the most effective form of magnesium is magnesium chloride, which has a strong excretory effect on toxins and stagnant energies

stuck in the tissues of the body, drawing them out through the pores of the skin. Chloride is required to produce a large quantity of gastric acid each day and is also needed to stimulate starch-digesting enzymes .

In addition to its functions as an electrolyte, chloride combines with hydrogen in the stomach to make hydrochloric acid, a powerful digestive enzyme that is responsible for the breakdown of proteins, absorption of other metallic minerals, and activation of intrinsic factor, which in turn absorbs vitamin B12.

Using other magnesium salts is less advantageous because these have to be converted into chlorides in the body anyway. We may use magnesium as oxide or carbonate but then we need to produce additional hydrochloric acid to absorb them. Many aging individuals, especially with chronic diseases who desperately need more magnesium, cannot produce sufficient hydrochloric acid and thus cannot absorb the oxide or carbonate.

Chloride is a highly important and vital mineral required for both human and animal life. Without chloride, the human body would be unable to maintain fluids in blood vessels, conduct nerve transmissions, move muscles, or maintain proper kidney function. As a major electrolyte mineral of the body, chloride performs many roles, and is rapidly excreted from the body.

Magnesium chloride solution was not only harmless for tissues, but it had also a great effect over leucocytic activity and phagocytosis; so it was perfect for treatment of external wounds.

Dr. Jean Durlach

Dr. Jean Durlach et al., at the Université P. M. Curie, Paris, wrote a paper about the relative toxicities between magnesium sulfate and magnesium chloride. They write, “The reason for the toxicity of pharmacological doses of magnesium using the sulfate anion rather than the chloride anion may perhaps arise from the respective chemical structures of both the two magnesium salts.

Chemically, both  $\text{MgSO}_4$  and  $\text{MgCl}_2$  are hexa-aqueous complexes.

However  $\text{MgCl}_2$  crystals consist of dianions with magnesium coordinated to the six water molecules as a complex,  $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$

and two independent chloride anions,  $\text{Cl}^-$ . In  $\text{MgSO}_4$ , a seventh water molecule is associated with the sulphate anion,  $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$

$[\text{SO}_4 \cdot \text{H}_2\text{O}]$ . Consequently, the more hydrated  $\text{MgSO}_4$  molecule may have chemical interactions with paracellular components rather than with cellular components, presumably potentiating toxic manifestations while reducing therapeutic effect.”

$\text{MgSO}_4$  is not always the appropriate salt in clinical therapeutics.

$\text{MgCl}_2$  seems the better anion-cation association to be 20 20

used in many clinical and pharmacological indications. <sup>376 70</sup>

Dr. Jean Durlach et al.

Researchers studying the ionic fluxes in the two directions between the mother and the fetus found that there was a greater positive effect when  $\text{MgCl}_2$  was used and that  $\text{MgSO}_4$  could not guarantee the fetal needs in sodium and potassium exchange like  $\text{MgCl}_2$  could. They also found that  $\text{MgCl}_2$  interacts with all the exchangers in the cell membrane, while the effect of  $\text{MgSO}_4$  is limited to paracellular components without interaction with cellular components. Dr. Durlach summarized saying, “ $\text{MgCl}_2$

interacts with all exchangers while the interaction of  $\text{MgSO}_4$  is limited to paracellular exchangers, and  $\text{MgCl}_2$  increases the flux ratio between mother and fetus while  $\text{MgSO}_4$  decreases it.”

Magnesium sulfate contains aluminum that may be toxic. Aluminum may reach toxic levels with prolonged parenteral administration if kidney function is impaired. Premature neonates are particularly at risk because their kidneys are immature, and they require large amounts of calcium and phosphate solutions, which contain aluminum. Research indicates that patients with impaired kidney function, including premature neonates, who receive parenteral levels of aluminum at greater than 4-5 mcg/kg/day

accumulate aluminum at levels associated with central nervous system and bone toxicity. Tissue loading may occur at even lower 20

rates of administration. <sup>376</sup><sup>1</sup>

High-dosage, tocolytic magnesium sulfate (MgSO<sub>4</sub>) administered to pregnant women during preterm labor 20

can be toxic and sometimes lethal for their newborns. <sup>376</sup><sup>2</sup>

Chloride vs. Chlorine

The mineral supplement chloride is very different from the gas chlorine. Elemental chlorine is a dangerous gas that does not exist in the free elemental state in nature because of its reactivity, although it is widely distributed in combination with other elements. Chloride is related to chlorine however, as one of the most common chlorine compounds is common salt, NaCl.

Chloride is a by-product of the reaction between chlorine and an electrolyte, such as potassium, magnesium, or sodium, which are essential for human metabolism. Chloride salts are essential for sustaining human metabolism and have none of the effects of isolated chlorine gas.

Magnesium Chloride, Bromide & Iodine Dr. David Brownstein promotes the use of magnesium chloride as a supplement “synergistic” to treatment with iodine. Chloride





competes with bromide at the renal level and increases the renal 20

clearance of bromide, <sup>376</sup> thus magnesium chloride is ideal for magnesium supplementation. Some patients require up to two years of iodine therapy to bring post loading urine bromide levels below 10 mg/24 hr, if chloride load is not included in the bromine detoxification program. Dr. Brownstein says, “As with using any nutritional supplement, a comprehensive holistic treatment plan provides the best results. Magnesium is an important part of the iodine treatment plan. Magnesium deficiency is very common. Magnesium is nature’s relaxing agent. Magnesium levels (via red blood cell magnesium levels) should be assessed and supplementation instituted. Magnesium supplementation will 20 20

likely ensure optimal results with iodine.” <sup>376</sup> 74

## 1. Magnesium & Sports Medicine

Magnesium deficiency in humans was first described in the medical literature in 1934, but for some reason no one in government or in medicine got the message. Magnesium is clearly essential though still misunderstood and underused by the vast majority of practicing sports physicians, trainers, and coaches whose clear dedication is to the athletes themselves and their performance.

ATP (adenosine triphosphate), the main source of energy in cells, must be bound to a magnesium ion in order to be biologically active. What is called ATP is often actually Mg-ATP. This is vitally important to the athlete who needs 110 percent outputs from their mitochondria during performance. Little is it known that bicarbonate ions act as afterburners, thrusting the magnesium into the mitochondria, so when we combine magnesium therapy with bicarbonate we gain in cellular performance.

The use of magnesium for athletic performance can make the difference between winning and losing on a regular basis, thus magnesium nutrition is an area that no serious athlete or sports medicine practitioner can afford to overlook. Despite magnesium's

pivotal role in energy production and sports performance, many coaches and athletes remain critically unaware of its critical importance in maintaining health and performance. Research suggests that even small shortfalls in magnesium intake can 20 20

seriously impair athletic performance. <sup>376 75</sup>

Nielsen, F.H., Lukaski, H.C. 2006. Update on the relationship between magnesium and exercise. *Magnesium Research* . 19(3): 180-189.

Technical Abstract: Magnesium is involved in numerous processes that affect muscle function including oxygen uptake, energy production and electrolyte balance. Thus, the relationship between magnesium status and exercise has received significant research attention. This research has shown that exercise induces a redistribution of magnesium in the body to accommodate metabolic needs. There is evidence that marginal magnesium deficiency impairs exercise performance and amplifies the negative consequences of strenuous exercise (e.g., oxidative stress). Strenuous exercise apparently increases urinary and sweat losses that may increase magnesium requirements by 10-20%.

Based on dietary surveys and recent human experiments, a magnesium intake less than 260 mg/day for male and 220 mg/day for female athletes may result in a magnesium-deficient status.

Recent surveys also indicate that a significant number of individuals routinely have magnesium intakes that may result in a deficient status. Athletes participating in sports desiring weight control (e.g., wrestling, gymnastics) apparently are especially vulnerable to an inadequate magnesium status.

Magnesium supplementation or increased dietary intake of magnesium will have beneficial effects on exercise performance by magnesium-deficient individuals. Magnesium supplementation of physically active individuals with adequate magnesium status has not been shown to enhance physical performance. An activity-linked RNI or RDA based on long-term balance data from well-controlled human experiments should be determined so that physically active individuals can ascertain whether they have a magnesium intake that may affect their performance or enhance their risk to adverse health consequences (e.g., immunosuppression, oxidative damage, arrhythmias).

Magnesium deficiency reduces metabolic efficiency, increases oxygen consumption and heart rate required to perform work, all things that would take the edge off of athletic performance (not to mention carrying out the functions of normal life). The last thing any trainer or sports doctor wants to see is their athletes lose their competitive edge. Not performing to full capacity because of the lack of a mineral like magnesium is simply not an option for winners. Athletic endurance and strength performance increases significantly when a large amount of magnesium is supplemented transdermally/topically and orally.

A magnesium shortfall can cause a partial

uncoupling of the respiratory chain, increasing the amount of oxygen required to maintain ATP production.

Athletes, who might be expected to take greater care with their diets, are not immune to magnesium deficiency. Studies carried out in 1986/87 revealed that gymnasts, football and basketball 20 20

players were consuming only around 70 percent of the RDA, <sup>376</sup> 76

while the intake of female track and field athletes was even 20 20

lower, as low as 59 percent of the RDA. <sup>376 77</sup>

Evidence shows that a magnesium shortfall boosts the energy cost, and hence oxygen use, of exercise during activities like running 20 20

or cycling. <sup>376 78</sup> One study of male athletes supplemented with 390

mg of magnesium per day for 25 days resulted in an increased peak oxygen uptake and total work output during work capacity tests.

20 20

<sup>376 79</sup>

It is commonly thought that magnesium intakes above the RDA are unlikely to boost performance, but there is no evidence to support this assertion. First, RDAs are almost universally understated, even for the general population, representing bare minimums that should be taken for the maintenance of health. For athletes, RDAs are guides for failure since they do not take into account the extra demands and needs of an athlete's body. When it comes to magnesium, an athlete should be thinking many times the RDA if he or she wishes to maximize athletic performance. Having an adequate store of this vital, natural mineral will ensure total system availability, without the downside of using synthetic agents such as steroids that create physiological imbalances.

Maximal contraction of the quadriceps is positively 20 20

correlated to serum magnesium status. <sup>377 70</sup>

Studies have shown that dietary supplementation with 30 mg of zinc and 450 mg of magnesium daily can elevate testosterone levels up to 30 percent. Dr. Lorrie Brilla, at Western Washington University, recently reported that magnesium and zinc, when supplemented orally, significantly increase free testosterone 20

levels and muscle strength in NCAA football players.<sup>3771</sup> In another study, young athletes supplemented with 8 mg of magnesium per kilo of body weight per day, experienced significant increases in endurance performance and decreased oxygen 20

consumption during standardized, sub-maximal exercise.<sup>3772</sup> Dr.

Brilla reported that during an eight-week spring training program athletes had 2.5 times greater muscle strength gains than a 20

placebo group.<sup>3773</sup> Any athlete looking to gain strength, increase athletic performance, and muscle mass should consider greatly increasing their magnesium intake, as well as zinc.

Muscle endurance and total work capacity, declines

with nutritional deficiency of magnesium and zinc.

“Magnesium is essential to a diet for people who are under a lot of stress or want to experience the ultimate rush,” says Dr.

James Thor, National Director of Extreme Sports Medicine.

“Several reasons, one is if you are working out in a gym, or continual stress excessive amounts of lactic acid in the muscle have been linked to higher levels of anxiety,” Dr. Thor adds.

Large amounts of magnesium are lost when a person is under stress.

The combination of heat and magnesium chloride increases circulation and waste removal, and this principle can be applied during breaks in competition as well as after the game in deeply relaxing baths similar to Epsom salt baths, but much stronger. A magnesium chloride bath helps draw inflammation out of the muscles and joints. Dr. Mark Steckel recommends a hot bath with Epsom salts after a long run when the muscles are just aching. He also recommends soaking once a week “as a treat to your legs, just to keep them happy!” Switching to magnesium chloride will amplify this effect.

Transdermal magnesium chloride mineral therapy enhances recovery from athletic activity or injuries.

“Various nutrients have been shown to exert pharmacological effects, which are in many cases dependent on the concentration 20 20

of the nutrient,” reports Dr. Alan R. Gaby.<sup>377 74</sup> The FDA is not comfortable with this assertion though they have been forced, via recent court victories against them, to stop sending out their SWAT teams against farmers and everyone else who claim their foods have medicinal effects.

In the world of sports medicine, nutrient therapy can mean the difference between winning and losing and between health and injury. Besides attitude and training, nothing affects athletic performance like an athlete’s nutritional profile, because nutrients are the foundation of cellular function. Dr. Gaby presents the following case:

Case #11: An 18-year-old, 235-pound high school wrestler developed a flu-like illness four days before a major tournament.

Two days before the three-day tournament, when it appeared he might have to miss the event, he was given an IV injection of 16

mL vitamin C, 5 mL magnesium, 2.5 mL calcium, and 1 mL each of B12, B6, B5, and B complex. The next morning he remarked that he had more energy than he had ever had in his life. This energy boost persisted for the duration of the tournament, at which he took second place, a better performance than at any other time in his career. In this era in which many athletes are using performance-enhancing drugs, it is not the author’s intention to encourage athletes to seek another “boost” with IV nutrients.

However, this case does demonstrate that nutritional factors can play an important role in athletic performance.

The composition of the above IV formula was based on what was known as the famous Myers cocktail whose contents was not exactly recorded. The point above is not necessarily about the specific nutrients nor the method of

application but it is certainly clear that nutritional medicine is hugely more beneficial to athletes than pharmaceutical preparations will ever be.

Intravenous administration of nutrients can achieve serum concentrations not obtainable with oral or even intramuscular (IM) administration, Dr. Gaby asserts, but if one adds transdermal application with oral then we are in the same ballpark as an IV unless we are in an emergency situation. The pharmacological effects of nutrients are highly dependent on the concentration of the nutrient and it is true that we can raise concentrations strongly with IVs, but we can do the same by combining oral methods of administration with intense transdermal applications that flood nutrients into the body through all the pores in the skin for intense systemic effect.

We are introducing an entirely new way of approaching optimal performance levels through the application of specific nutrients in high concentrations. In our new form of sports medicine we are also working to avoid sports injuries as well as treat them when they do occur with something the sports world has long been waiting for.

There are some fundamental questions that should be asked of any proposed approach to sports medicine. Does it do what it claims it will do? What are the benefits? What are the risks? What are the alternatives? Usually in medicine the truth is complicated, but complications are the last thing athletes and their trainers want or need.

What we promise is easily confirmed by individual athletes and their doctors and coaches; you will find in these pages testimonials from athletes who have been open enough to try something new. We offer a smorgasbord of benefits with close to zero risk and for a thousand years there will not be any alternatives because we are concentrating the basics of life itself into a formula that will super-charge athletic performance. Just as there will never be an alternative to proper breathing, there will never be an alternative to essential nutrients like magnesium, bicarbonate, and iodine.

What we promise is an increase in oxygen-carrying capacity and supercharged mitochondrial function. In addition, red blood cells will become healthier, cell walls more permeable, cellular waste removal amplified, tissues more flexible, and general pH

heightened. Vitally important for the athlete is detoxification and actual chelation of heavy metals and other dangerous toxic chemicals from the tissues. Sports physicians should know that

the danger of dying in sports competitions is augmented by increases in mercury contamination in the heart tissues. But they don't teach athletes how to remove the mercury or better yet how to avoid mercury contamination in the first place.

Athletes should never take the yearly flu shots that contain mercury, and for sure they should never allow a dentist to put mercury fillings in their mouths if they want to avoid the possibility of sudden death during performance. Any and all kinds of heavy metal accumulation will hurt cellular respiration as well as oxygen-carrying capacity.

There are many things that you can do to improve your athletic performance. One of the most basic ways to improve your performance is through proper diet and dietary supplements, which can, when used appropriately add rocket fuel to your mitochondria and help reduce acid buildup thus reducing fatigue. When it comes to game day, you want to make sure that your body has the access to all of the nutrients and energy it needs to perform as efficiently as possible and this can be accomplished in the most proficient way with certain key nutrients.

Magnesium and bicarbonate are the most important minerals to sports nutrition. Their use for athletic performance can make the difference between winning and losing and between sickness and health thus no serious athlete or sports medicine practitioner can afford to overlook these mineral salts. When magnesium is deficient, things begin to die, but when our body's magnesium levels are topped off, our body physiology tends to hum along like a racecar yielding higher performance along many physiological parameters.

Sodium bicarbonate (baking soda) facilitates the removal of hydrogen ions from the muscle cell so as to help maintain the muscle cell near its optimal pH for enzyme functions and energy production. The pH in the muscle cells is slightly alkaline while at rest. Normally, it is at this level that enzymes that produce energy via the lactic acid and oxygen energy systems perform



at their optimum. As the concentration of hydrogen ions and acidity increases in the muscle cells optimal functioning of enzymes will be disturbed and energy production will decrease.

Fatigue results because of increased acid production within the muscle cell when the lactic acid energy system is used during high intensity exercise. During rest and exercise, proteins within the muscle cell help to buffer metabolic acids. But beyond the initial buffering in the cell, during exercise, the lactic acid produced appears to be buffered almost entirely by the sodium bicarbonate in the blood. Our body produces and uses plain 20 20

old baking soda to protect its blood from acidity. <sup>377 75</sup>

Only a few top coaches and sports doctors understand and have mastered the use of magnesium, bicarbonate, and other minerals like potassium and calcium. The word few is used literally here

for we are staking entirely new ground in sports medicine introducing not only transdermal magnesium therapy but also bicarbonate bath therapy, which bypasses all the gastrointestinal problems some athletes have when ingesting bicarbonate orally.

### Heavy Exercise & Sweating

When we sweat, we lose more than just water. Other components of sweat include electrolytes, principally sodium and magnesium.

Loss of magnesium by sweating takes place at an accelerated pace when there is a failure in sweat homeostasis, a situation, which arises when exercise is made in conditions of damp atmosphere and 20 20

high temperature. <sup>377 76</sup>

In reality a quartet of electrolytes play a critical role in muscle function and other biochemical processes. The loss of sodium is by far the most substantial and well-studied but the loss of and replacement of potassium, calcium and magnesium are also of supreme importance because over time all are lost through sweat.

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Dr. Jonathan Toker, <sup>377 77</sup> an elite-level runner-triathlete writes,

“Extended periods of exercise at even moderate intensity can cause significant losses of fluid through sweating. Electrolytes, including sodium, potassium, magnesium and calcium, are present in this sweat at levels that over time will cause your body to become depleted. Muscle cramping, loss of performance, heat stress, and other symptoms can result from reduced electrolyte levels and dehydration. Consumption of water will act to further dilute remaining electrolyte reserves and can exacerbate symptoms, even to the point of death. Common approaches by athletes to deal with these very real nutritional issues include consuming sports drinks and/or solid electrolyte supplementation (capsules). The following table illustrates the function of critical electrolytes and provides a target dose during fluid intake and overall daily intake range for active individuals.

Ref: Kim Mueller [www.fuel-factor.com](http://www.fuel-factor.com)

Dr. Toker continues, “Both fluid and electrolyte supplementation are necessary during longer training and racing, depending on the athlete and the conditions. Two competing factors, dehydration and hyponatremia, necessitate the balance between proper fluid intake and electrolyte intake. The key term here—balance—means that there are ideal athlete-specific and condition-specific plans to optimize performance and minimize health risks. Whether the supplementation is a solid electrolyte and water or a sports drink, athletes ignoring one or both of these aspects do so with the peril of, at best, limited performance, or at worst, danger to their health.”

Other minerals excreted in sweat are: zinc, chromium, and 20 20

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selenium; <sup>377 78</sup> , <sup>377 79</sup> these minerals are used up in the metabolism 20 20

of strenuous exercise and are difficult to replenish. <sup>378 70</sup>

Selenium is important in that it neutralizes the toxic effects of mercury. This is especially important for athletes who have a 20

mouthful of mercury-containing dental amalgam. <sup>3781</sup>

Beware the sports people who say that the amount of magnesium lost through sweat is negligible, making magnesium 20

supplementation unnecessary. <sup>3782</sup> Dr. Sarah Myhill says, “Heavy exercise also makes you lose magnesium in the urine and this explains why long distance runners may suddenly drop dead with heart arrhythmias.”

Magnesium depletion and deficiency play a role 20

in the pathophysiology of physical exercise. <sup>3783</sup>

Sports Injuries & Transdermal Magnesium Therapy Transdermal magnesium chloride mineral therapy enhances recovery from athletic activity or injuries.

Injury is an almost inevitable part of an athlete’s life. It may take the form of an acute ligament tear or be as mild as postexercise muscle soreness. Either way, the majority of sports related injuries can be prevented or alleviated. It is not uncommon to hear of an athlete suffering a sports injury.

Generally when a star athlete is injured, the injury becomes headline news. And the public waits anxiously to hear any news on the condition of the player.

Every athlete gets injured from time to time; it’s part of the courage and discipline of athletes to endure and a challenge to their spirits to remain positive and optimistic about their return to full performance. When an athlete gets injured they want top quality care that is at the leading edge of sports medicine.

If you are like most athletes, you want to heal naturally from your injury and do so in record time without having to resort to drugs or surgery. There

is no greater way to accomplish this then employing transdermal medicine using magnesium chloride and sodium bicarbonate.

Dr. Jeff Schutt says that hamstring injuries can be avoided through nutritional support because contraction and relaxation are dependent on adequate cellular levels of magnesium. “A shortened hamstring is a result of lack of available magnesium,”

he says. Liquid magnesium chloride can be simply sprayed and rubbed into a sore Achilles tendon to decrease swelling. And soaking the feet in a magnesium chloride footbath is the single best thing—apart from stretching—that you can do to protect yourself from or recover from hamstring and other injuries.

As already explained, oral magnesium is not easily absorbed and at high doses creates diarrhea. Thus taking magnesium orally offers little to athletes while transdermal application opens up an entirely new universe to athletes as well as their coaches and doctors. A whole new world of sports medicine is going to explode when athletes and coaches find out that magnesium chloride from natural sources is available for topical use.

## Sports Massage

Having one’s massage therapist use the magnesium oil is Nirvana for athletes.

Sports massage is excellent as a pre-event rubdown or for post-event recovery to sooth the aches and pains caused by physical exertion. A restorative or rehabilitative sports massage during training helps the athlete train harder or nurse a sports injury back to health. Imagine if magnesium oil is used instead of massage oils how much more dramatic will be the results. Massage has been used for thousands of years and in recent decades has re-emerged as an accepted method to enhance the physical, physiological, and psychological wellbeing of athletes.

Magnesium sports massage increases flexibility and muscle tone and therefore reduces the risk of injury. Other benefits are: breakdown of scar

tissue after injury, improved blood circulation and oxygenation, and providing general relaxation and reduced stress. Athletes recovering from injuries will find that magnesium massage will speed up their return to competition.

Even non-athletes, people who are active either through work or

“play,” tend to become hurt or sore. These individuals are in need of a massage modality that will enable them to maintain their active lifestyle and recover faster. A magnesium sports massage on a regular basis will assist with the body’s natural recovery process, thus speeding up healing as well as helping to prevent future injuries for those sore and stiff muscles.

A typical treatment of sports injuries includes massage, gentle rhythmical movements (harmonics), stretching, and articulatory and manipulative techniques. Emphasis is placed on increasing the range of movement, decreasing muscle tension, and improving circulation of the blood vessels and lymphatic system. The effect of this is to decrease swelling and pain, thereby enhancing the body’s self-healing process.

Note: Always apply magnesium oil before touching or putting ice on an injury. The first thing we want rushing to any area of pain and inflammation is magnesium.

Magnesium is the single most important mineral to sports nutrition. Adequate magnesium levels will help an athlete’s body against fatigue, heat exhaustion, blood sugar control, and

metabolism. It also offers part of the secret why athletes often die young—magnesium levels in tissue analysis of athletes who have heart attacks are usually very low while mercury levels are often very high.

## 1. Magnesium & Back Pain Management

Americans’ intake of magnesium dropped 50 percent in the last century, and the consequences are quite painful.

Thirty-one million Americans experience low-back pain at any given time. One half of all working Americans admit to having back pain symptoms each year. Back pain is one of the most common reasons for missed work. In fact, back pain is the second most common reason for visits to the doctor's office, outnumbered only by upper-respiratory infections. Nearly everyone at some point has back pain that interferes with work, routine daily activities, or recreation.

Americans spend at least \$50 billion each year on low back pain, the most common cause of job-related disability and a leading contributor to missed work. Back pain is the second most common neurological ailment in the United States—only headache is more common—so it behooves us to learn what to do about it. As many as 80 percent of us will experience a back problem at some time in our lives and yet if you look around at the medical literature and even at alternative sites, including chiropractic and osteopathic sites, one does not get a clear picture of what one can do for this common problem, which does land many in bed with excruciating pain.

Soft tissue and joint manipulation, whether it be in the form of varying massage techniques, physical therapy or chiropractics, rarely takes into consideration the biochemical needs of the cells which constitute the tissues being manipulated. While there are many biochemical necessities that may come into question, none can be considered more essential to normal cellular function than that of the magnesium ion, especially when it pertains to the health of muscles, joints, and the nervous system.

Back and neck pain can be miserable. Injury, herniated disc, spinal stenosis, osteoarthritis, vertebral compression fracture—

even a simple back sprain—can cause life-altering pain. Back pain is one of the most common reasons people seek medical care and yet what doctors recommend usually does not help all that much.

Years ago patients with back pain were told to get off their feet and stay in bed for a week. After much scientific study, it was proven that inactivity does little to conquer back pain.

Magnesium chloride, when applied directly to the skin, is transdermally absorbed and has

an almost immediate effect on pain.

Transdermal magnesium therapy shines brightly in the area of pain management, often bringing instant relief when applied liberally to any kind of physical pain. Every back patient should be applying magnesium chloride both transdermally (topically) and orally to treat the fundamentals of inflammation, pain, and calcification. When it comes to back pain, it is not easy to pinpoint a clear diagnosis but one can be assured that applying magnesium both locally and systemically is going to help tremendously, even in the worst conditions where physicians are already recommending surgery. Both magnesium baths and magnesium massage top the list of treatments that are tremendously helpful when dealing with back and neck pain.

Magnesium has a calming effect on the

nervous system so it can be used quite effectively to calm irritated and over-excited nerves.

Magnesium penetrates into the source of the pain bringing healing and relief, not only because it addresses the inflammation so well, but also because magnesium deficiency, which most people suffer from, is a basic cause of back pain as much as poor posture is. Back pain along with most other types of pain are often, if not universally, provoked by magnesium deficiencies, so using magnesium in adequate dosages and with frequent topical application will cut into the pain like a knife through warm butter.

A German study found that mineral supplements increased intracellular magnesium levels by 11 percent and were associated with a reduction in pain symptoms in 76 out of 82 people with 20 20

chronic low-back pain.<sup>378 74</sup> Whether it be chronic or acute, a sprain or a strain, a pull or a tear, it would be safe to assume that everyone has experienced some degree of muscle or joint pain in their lifetime, yet the

role of added magnesium in managing these issues is rarely mentioned as a focal point of therapy.

Administering magnesium not only decreases pain in most cases, but a magnesium deficiency is often associated with muscle pain, 20 20

especially back pain. <sup>378 75</sup> In cases of acute pain, magnesium given intravenously is widely recognized to have powerful 20 20

analgesic effects <sup>378 76</sup> —so much so that it has been the subject of numerous clinical studies examining the extent of its ability 20 20

to attenuate post-operative pain <sup>378 77</sup> following major cardiac 20 20

and lumbar surgeries. <sup>378 78</sup>

Most back pain inflammation is initially caused by some sort of trauma to the lower back. The pain can get very severe and drastically limit one's mobility. The origin of back pain or inflammation can be a result of many different activities like sports, gardening, or doing work around the house. Symptoms of

lower-back inflammation can include numbness in the arms and legs, shooting pain, limited flexibility, and inability to stand straight. The frustrating thing about lower-back pain caused by inflammation is that it can be very difficult to determine the cause. When you sneeze or cough, you feel pain all over.

## Heat & Back Pain

Heat is often applied with a pad to areas of the back that are painful and/or inflamed. When this treatment method proves effective it is because heat makes blood vessels get larger, which in turn increases blood flow and oxygen levels. Using sodium bicarbonate and magnesium chloride orally will increase oxygen transport and will further dilate the vessels bringing even more blood to the area. Heat increases blood flow and makes connective tissue more flexible. It temporarily decreases joint stiffness, pain, and muscle spasms. Heat also helps reduce inflammation and the



buildup of fluid in tissues (edema). Heat therapy is used to treat inflammation (including various forms of arthritis), muscle spasm, and injuries such as sprains and strains.

Heat may be applied to the body's surface or to deep tissues. Hot packs, infrared heat, paraffin (heated wax), baths, and hydrotherapy (agitated warm water) provide surface heat. Heat may be generated in deep tissues by electric currents (diathermy) or high-frequency sound waves (ultrasound).

**Magnesium Puts the Chill on Inflammation** Inflammation is a response from your immune system in response to an irritant. For example, if you sprain your ankle, your immune system creates a protein called a circulating immune complex (CIC

for short). The CIC travels down to the injured ankle and causes pain and swelling. The pain you feel is to inform you of the injury or damage. And the swelling is protective as it prevents you from moving it and causing more irritation. This is also your body's way of running to the problem with fresh blood, antibodies and vital cells in order to begin healing and repairing the damage.

Inflammation plays a key role in back pain. Inflammation is the activation of the immune system in response to infection, irritation, or injury. Characterized by an influx of white blood cells, redness, heat, swelling, pain, and dysfunction of the organs involved, inflammation has different names when it appears in different parts of the body.

The inflammatory response can be acute or chronic. Acute inflammation typically lasts only a few days. This response usually

promotes healing but, if uncontrolled, may become harmful.

A hot magnesium bath is a great treatment choice for most people's low-back pain and is more indicated than icing— which is usually harmful—but soaking in the tub may simply be the single best therapy there is for low-back pain, or at least the best bang for your buck! And yet many people actually avoid a hot bath when they have low-back pain—tragically—because they think they are “inflamed” and the heat will make it worse.

This is very rarely the case. Please see my e-book, Medical Bicarbonate Magnesium Baths .

## Conclusion

By resting painful joints and muscles, you give your spine time to heal. Common sense would also tell you to eliminate any movements or activities that cause your pain. Ice is often used successfully to reduce inflammation, spasms, and pain in the back because ice makes blood vessels get smaller. Alternating hot and cold packs is often recommended by professionals.

The benefit of magnesium to massage therapy, chiropractics, physical therapy, and other related specialties is unquestionable. Without doubt the therapeutic effect of topically applied magnesium chloride is invaluable. As highlighted previously, the application of magnesium chloride to the skin produces immediate and long-lasting results by correcting poorly functioning cells from a biological standpoint . Topical magnesium chloride is most widely known as “magnesium oil” which is actually a supersaturated solution of magnesium chloride and other trace elements. Other convenient forms include gelled magnesium chloride for tissue manipulation, and bath flakes for soaks, with each product offering its own unique advantages depending on the application.

1. Magnesium for Safer Pregnancy & Birth Pregnancy cannot be normal unless magnesium levels are adequate

. The concentration of magnesium in the placental and fetal tissues increases during pregnancy. The requirements for this element in a pregnant woman’s organism generally exceed its supply; hence, pregnancy should be considered a condition of 20 20

“physiological hypomagnesemia.” <sup>378 79</sup>

Magnesium sulfate is used intravenously to prevent hypertensive 20 20

crises or seizures associated with toxemia of pregnancy. <sup>379 70</sup>

Magnesium is needed for reproductive fertility <sup>3791</sup> , <sup>3792</sup> and the use of pharmaceutical contraceptives is known to diminish 20

magnesium stores in our body. <sup>3793</sup> The rate of premature births 20 20

has increased more than 30 percent since 1981, <sup>379 74</sup> but a central and obvious cause is ignored by doctors. Magnesium plays a 20 20

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crucial role in fertility, pregnancy, <sup>379 75</sup> , <sup>379 76</sup> , <sup>379 77</sup> and in 20 20

early newborn life, <sup>379 78</sup> and many of the problems associated with pregnancy and birth can be resolved by magnesium supplementation.

In 1991 Dr. Jean Durlach said, “Primary magnesium deficiency may occur in fertile women. Gestational magnesium deficiency is able to induce maternal, fetal, and pediatric consequences that might last throughout life. Experimental studies of gestational magnesium deficiency show that magnesium deficiency during pregnancy may have marked effects on the processes of parturition and of postuterine involution. It may interfere with fetal growth and development from teratogenic effects to morbidity—i.e.

hematological effects and disturbances in temperature regulation.

Clinical studies on the consequences of maternal primary magnesium deficiency in women have not been sufficiently investigated.”

Magnesium is frequently used as the treatment for stopping premature labor and the seizures of eclampsia upon onset, but even more helpful would be to prevent these events by supplementing magnesium throughout the course of pregnancy.

Several randomized controlled trials (RCTs) have provided compelling evidence that magnesium is the drug of choice for maternal seizure

prophylaxis in pre-eclampsia, whether preterm or 20 20

term. <sup>379</sup> 79

Magnesium sulfate and magnesium chloride are used in obstetrics to stop premature labor and prevent seizures in women with hypertension. Dr. Durlach has shown the increased safety of using 20 20 20

magnesium chloride over magnesium sulfate. 74 70 70 Even worse is the evidence that magnesium deficiency or depletion is involved in 20 20

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the etiology of sudden infant death syndrome (SIDS). 74 70<sup>1</sup> , 74 70<sup>2</sup>

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The evidence is clear that inadequate magnesium intake is common during pregnancy and that the plasma levels of magnesium tend to fall, especially during the first and third trimesters of pregnancy.

Dr. Mildred S. Seelig

In 1987, Dutch researchers found that magnesium prevents hemorrhaging in the brains of infants whose mothers have a form of hypertension. Another surprising outcome from studies done was the reduction of mental retardation when magnesium was provided 20 20 20

during pregnancy. 74 70 74

Scientists have shown that giving magnesium to pregnant women may greatly reduce the incidence of cerebral palsy in infants born weighing less than 3.3 pounds. These low-birth-weight infants are 60-75 times more likely to develop cerebral palsy than babies that reach a normal weight before birth—and the number of children with cerebral palsy is growing. The results of a 10-year study published in the August 28, 2008 issue of the

New England Journal of Medicine found that magnesium administered to pregnant women delivering before 32 weeks of gestation reduced the risk of

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cerebral palsy by 50 percent. 74 70 75 The Beneficial Effects of Antenatal Magnesium (BEAM) trial was conducted in 18 centers in the U.S., including Northwestern Memorial, and is the first prenatal intervention ever found to reduce the instance of cerebral palsy related to premature birth.

The role of magnesium begins its importance during pregnancy when it helps build and repair body tissue in both mother and fetus. A 20 20 20

severe deficiency during pregnancy may lead to preeclampsia, 74 70 76

birth defects, and infant mortality. Magnesium relaxes muscles, and research suggests that proper levels of magnesium during pregnancy can help keep the uterus from contracting until week 35. Dropping magnesium levels at this point may start labor contractions.

### Magnesium & Gestational Diabetes

In the United States 180,000 women developed gestational diabetes in 2007. Gestational diabetes is a form of glucose intolerance diagnosed during pregnancy. Gestational diabetes occurs more frequently among African Americans, Hispanic/Latino Americans, and American Indians. It is also more common among obese women and women with a family history of diabetes.

During pregnancy, gestational diabetes requires treatment to normalize maternal blood glucose levels to avoid complications in the infant. Immediately after pregnancy, 5-10 percent of women with gestational diabetes are found to have diabetes, usually type 2. Women who have had gestational diabetes have a 40-60

percent chance of developing diabetes in the next 5-10 years.

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74 70 77 The underlying pathophysiology of gestational diabetes is a function of decreased maternal insulin sensitivity or increased insulin resistance, both of which are affected by magnesium; adequate magnesium levels reduce insulin resistance and increase insulin sensitivity.

Research has found that compared with non-pregnant women, total and ionized magnesium were significantly lower in both normal pregnant and gestational diabetic subjects. Gestational diabetic women had significantly lower intracellular free magnesium values compared with non-pregnant and normal pregnant individuals both.

These results support the presence of magnesium depletion in pregnancy itself and to a greater extent in gestational diabetes and very likely predisposes to the vascular complications of 20 20 20

pregnancy. 74 70 78 There is also a significant risk of adolescent obesity and type 2 diabetes in the offspring of these women.

Gestational diabetes holds significant risks for a primary 20 20 20

cesarean and for preterm birth in all women. 74 70 79 Using magnesium oil in baths during pregnancy can prevent these serious complications for both mother and child.

For many women, the height of luxury is soaking in a warm and even hot therapeutic bath. For pregnant women the bath itself is

very relaxing with the real allure of a half-hour of no responsibility and no interruptions. A warm bath is not only safe, but very soothing for the pregnant mom-to-be. In fact, many doctors will recommend the use of a warm bath not only to soothe tired and aching muscles, but also to alleviate the pain associated with sciatica, the swelling associated with edema, and for women suffering from hemorrhoids.

Adding magnesium to the bath (bicarbonate included) will benefit both mother and fetus in very important ways. For more detail, please see my e-book, Medical Bicarbonate Magnesium Baths .

## 1. Magnesium & Sleep Disturbances

Simply put, there is nothing like a hot soak in a magnesium chloride bath before bed. Such soaks are heaven on earth for people who suffer from insomnia and the feelings of restlessness in the limbs. Instead of ingesting further chemical toxins in the form of pharmaceutical sleeping pills, which further deteriorate health, a person can bathe in a deep relaxing hot magnesium bath similar to what is available at some of the most famous spas around the world. Not only will you sleep better but your overall health will also be enhanced. All you have to do is pour into your bathwater some magnesium chloride along with a pound of sodium bicarbonate and some sodium thiosulfate. Nothing could be simpler.

For decades, statisticians have demonstrated that the majority of Americans do not get the government's minimum daily requirement for magnesium, and unfortunately we pay for it when it's time to go to sleep. About 42 million sleeping pill prescriptions were filled in 2005, according to the research company IMS Health, up nearly 60 percent since 2000. According to the National Sleep Foundation (NSF), almost six out of ten Americans report having insomnia at least a few nights weekly. Insomnia is defined as an

“inability to fall asleep or remain asleep long enough to feel rested, especially when the problem continues over time.”

Lack of sleep is a health concern because it can cause attention and memory problems, depressed mood, and body chemistry changes that foster heart disease, diabetes, and osteoporosis. As many as 47 million adults may be putting themselves at risk for injury as well as health and/or behavior problems because they aren't fulfilling their minimum sleep requirement in order to be fully alert the next day. Sleep deprivation and sleep disorders are estimated to cost Americans over \$100 billion annually.

In an effort to combat this, as many as 25 percent of the people in the United States use medications to help them sleep. The problem is that pharmaceutical sleep aids do not resolve the underlying cause of the problem, plus they stay in the bloodstream, resulting in a hangover the next

day along with impaired memory and less than optimum performance on the job or at home. More than half of all people aged 65 years and older

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have sleep problems. <sup>74</sup> Yet, scientists have proven that poor sleep is not a natural part of aging. A risk factor for low magnesium status in older women is the use of calcium supplements for bone health without sufficient magnesium. High calcium intakes can make magnesium deficiency worse.

The newest generation of sleep aids causes strange side effects including sleepwalking and short-term amnesia. Ambien, the nation's best-selling prescription sleeping pill, shows up with regularity as a factor in traffic arrests, sometimes involving drivers who later say they were sleep-driving and had no memory of taking the wheel after taking the drug. Steven Wells quit using the drug Ambien after becoming concerned about several episodes, one in which he woke up to find he had messily raided the refrigerator and another, after an incident of tearing a towel rack out of a wall.

We find none of these side effects when taking magnesium to help one relax and sleep. Animals placed on magnesium-deficient diets will commonly develop disorganized sleep and periods of 20

wakefulness. <sup>74</sup> Sleep problems occur more frequently in adults as they age, making it increasingly difficult to deal with stress. Magnesium supplementation partially reverses age-related 20

sleep abnormalities. <sup>74</sup> Magnesium is an essential mineral that plays a major role in the functioning of the musculoskeletal system. Magnesium allows the muscles to relax, providing a calming effect that allows for deeper relaxation and better sleep.

Researcher Dr. W. Davis used magnesium chloride as a means of combating insomnia. In a study, Dr. Davis reported that sleep was induced rapidly, was



uninterrupted, and that waking tiredness disappeared in 99 percent of the patients. In addition, anxiety 20

and tension diminished during the day. 74<sup>13</sup>

According to a 2008 survey of 1,137 employed U.S. adults, most Americans are losing sleep over news of a declining economy, increased cost of food and energy, rising unemployment, mortgage foreclosures, and plunging home values. The study said 9 of 10

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respondents were losing sleep over economic turmoil . 74<sup>174</sup> The vicious cycle of economic stress, lack of sleep, diminished immunity, and magnesium depletion is fully evident in the medical literature.

Magnesium has a calming effect on the nervous system and is considered the “anti-stress” mineral and a natural tranquilizer

. In the elderly, magnesium supplements were found to improve sleep by decreasing the release of cortisol, a known cause of sleep disruption. Stress depletes magnesium and magnesium relieves stress. When your magnesium levels are low, your nervous system gets out of balance and you feel on edge, naturally resulting in tightening muscles.

When we are under stress,

our need for magnesium skyrockets.

According to the U.S. National Academy of Sciences, as early as 1977, 50 studies completed in nine countries indicated that magnesium deficiency might result in death from cardiovascular disease. That’s right, it’s death by magnesium deficiency.

Although magnesium is available in hard water, dark green vegetables, nuts, and beans, we use it up in tremendous quantities when we’re under stress;

and when we eat a poor diet, especially a high-starch diet, we also deplete cellular magnesium levels in our bodies.

Chronic mental or physical stress serves as a trigger for heart attack or stroke. A study of college students who were sleep deprived while studying for final exams found that stress cut the concentration of magnesium in red blood cells in half and impaired the ability of blood vessels to widen (dilate) to 20

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control blood pressure. 74<sup>175</sup> Lack of sleep can lead to chronic fatigue, which is associated with sudden-death heart attack.

Chronically sleep-deprived adults commonly develop magnesium shortages that are also associated with a tendency for blood cells to clot, which is what causes strokes and heart attacks.

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74 <sup>176</sup> Several studies show a lack of magnesium can alter electrical activity in the brain, causing agitated sleep and frequent waking up.

Sleep disorders caused by magnesium deficiency are usually agitated with frequent nocturnal awakenings.

Magnesium helps people fall asleep faster and stay asleep.

Insomnia is one of the central, or neurotic, symptoms of chronic magnesium deficiency. A number of parasomnias (night terrors, nocturnal verbal and motor automatisms, restless leg syndrome) are highly correlated to magnesium deficiency. When we lose magnesium, we lose sleep and then we lose our balance emotionally, and then depression or even hyperactivity can set in.

Magnesium oil, (chloride), when applied transdermally to the legs, is effective in relieving restless leg syndrome (RLS).

Approximately 12 million Americans have restless leg syndrome, a sleep and movement disorder characterized by unpleasant feelings (tingling, crawling, creeping and/or pulling) in the legs, which cause an urge to move in order to relieve the symptoms; this is obviously highly disruptive to one's sleep.

### 37 . Warnings & Contraindications

Toxic symptoms from increased magnesium intake are not common because the body eliminates excess amounts unless there are serious problems with kidney function. Magnesium excess sometimes occurs when magnesium is supplemented as a medication

(intravenously) because adding magnesium in very large doses in isolation from other nutrients can cause harmful effects on the body. In reality, problems with magnesium supplementation usually occur when the magnesium in the IV is given too rapidly or in too high of a dose, or both.

There is the balance of calcium to magnesium to be kept in the range of 1:1 to 2:1. If you take more magnesium than calcium, then you are going to upset your calcium balance. However, this is not an issue for people whose dairy intake is high. Most people today are getting too much calcium and not enough magnesium.

The ratio of minerals and vitamins to each other is important.

Scientists from the University of Helsinki said, "The present average sodium intakes, approximately 3000-4500 mg/day in various industrialized populations, are very high, that is, 2-3-fold in comparison with the current Dietary Reference Intake (DRI) of 1500 mg. The sodium intakes markedly exceed even the level of 2500 mg, which has been recently given as the maximum level of daily intake that is likely to pose no risk of adverse effects on blood pressure or otherwise.

By contrast, the present average potassium, calcium, and magnesium intakes are remarkably lower than the recommended intake levels (DRI). In the U.S., for example, the average intake of these mineral nutrients is only 35-50 percent of the recommended intakes. There is convincing evidence

indicating that this imbalance—the high intake of sodium on one hand and the low intakes of potassium, calcium, and magnesium on the other hand—

produce and maintain elevated blood pressure in a big portion of the population. Decreased intakes of sodium alone and increased intakes of potassium, calcium, and magnesium each alone decrease elevated blood pressure.

A combination of all these factors—decreases of sodium and increases of potassium, calcium, and magnesium intakes that are characteristic of the so-called Dietary Approaches to Stop 20

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Hypertension (DASH) 74<sup>177</sup> diets—have an excellent blood-pressure-20

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lowering effect.” 74<sup>178</sup>

In isolation and in too high a quantity anything can become a problem. There is a balance needed between minerals, trace elements, and large amounts of magnesium used to treat disorders.

Spirulina is offered as the ideal complement to transdermal magnesium chloride therapy, for it is a potent medicine in its own right. (See my essays on “The Waters of Life.”) Spirulina, which is high in chlorophyll, is probably the most potent food on planet earth and provides a complete list of all the minerals and trace elements as well as amino acids and fatty acids we need to sustain life. Anything that has chlorophyll has magnesium since magnesium is the center of the chlorophyll molecule.

Some people, especially children, might develop a rash from using the magnesium oil when applied directly to the skin. If the magnesium oil is used at full strength, many children will feel a burning or stinging and this can be painful; if this happens the oil should be washed off quickly. In such cases you need to dilute the magnesium oil 50/50 with distilled or mineral water; as the body acclimates to the magnesium, the full concentration can

eventually be applied. A rule of thumb about dosage: It is always a good idea to start with low dose and work up gradually to higher doses. Whenever any kind of uncomfortable reaction occurs this is a sign to lower the dosage or concentration.

Magnesium is regulated and excreted primarily by the kidneys where various ATPase enzymes are responsible for maintaining 20

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homeostasis. 74<sup>179</sup> Magnesium toxicity can occur in people with hypothyroidism, those using magnesium-containing medications such as antacids, laxatives, cathartics, and in those with certain types of gastrointestinal disorders, such as colitis, gastroenteritis, and gastric dilation, which may cause an increased absorption of magnesium.

Risk of magnesium toxicity is usually related to severe renal insufficiency—when the kidney loses the ability to remove excess magnesium. Individuals with impaired kidney function are at higher risk for adverse effects from magnesium supplementation and people with severe renal insufficiency should avoid magnesium supplementation or approach it very carefully starting with very low dosages. Magnesium supplementation in children with dehydration or renal failure is also contraindicated, so before beginning any kind of magnesium treatment, any dehydration needs to be addressed.

Signs of excess magnesium can be very subtle and can occur with long-term use of magnesium supplements and laxatives. The symptoms can be similar to magnesium deficiency and include: changes in mental status, nausea, diarrhea, loss of appetite, muscle weakness, difficulty breathing, extremely low blood pressure, and irregular heartbeat. Though extremely rare, severe magnesium intoxication is manifested by a sharp drop in blood pressure and respiratory paralysis. Disappearance of the patellar reflex is a useful clinical sign to detect the onset of magnesium intoxication. In the event of overdose, artificial ventilation must be provided until a calcium salt can be injected intravenously to antagonize the effects of magnesium.

The most common cause of hypermagnesemia is renal failure. Other causes include the following:

Excessive intake

Lithium therapy

Hypothyroidism

Addison's disease

Familial hypocalciuric hypercalcemia

Milk alkali syndrome

Depression

Most adverse effects of parenterally-administered (intravenous) magnesium are usually the result of magnesium intoxication. These include flushing, sweating, hypotension, depressed reflexes, flaccid paralysis, hypothermia, circulatory collapse, cardiac and CNS depression proceeding to respiratory paralysis. Hypocalcemia, with signs of tetany secondary to magnesium sulfate therapy for eclampsia, has been reported.

Intravenous administration of magnesium could accentuate muscle relaxation and collapse the respiratory muscles if given too rapidly or in too high a dosage. Patients with excessively slow heart rates should also be careful because slow hearts can be made even slower, as magnesium relaxes the heart. And when there is an obstruction in the bowel, additional caution is required because the main route of elimination of oral magnesium is through the bowel.

Magnesium supplementation is known to interact with many different pharmaceutical drugs and it is wise to know what these are when treating patients. Certain drugs will increase the loss of magnesium in urine. Thus, taking these medications for long periods of time may contribute to magnesium depletion. On the other hand, many antacids and laxatives contain magnesium. When frequently taken in large doses, these drugs can

inadvertently lead to excessive magnesium consumption and hypermagnesemia, which refers to elevated levels of magnesium in blood.

### Some Recommendations on Dosing Related to Medications When Used with Magnesium

#### Doxycycline

Magnesium may make doxycycline less effective. Take magnesium supplements 1-3 hours before or after ingesting doxycycline.

#### Minocycline

Magnesium may make minocycline less effective. Take magnesium supplements 1-3 hours before or after ingesting minocycline.

#### Tetracycline Hydrochloride

Magnesium may make tetracycline less effective. Take magnesium supplements 1-3 hours before or after ingesting tetracycline.

#### Diabetes Medicines

Glipizide (Glucotrol®) and Glyburide (Micronase, Glynase, Diabeta). Taking magnesium and either Glipizide or Glyburide together may further lower blood sugar leading to blurred vision, tremor (shaking), hunger, sweating, headache, skipped heartbeats, confusion, nervousness and extreme tiredness.

Magnesium (also commonly found in antacids) may increase the absorption of glipizide and glyburide, medications used to control blood sugar levels. Ultimately, this may prove to allow 20

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for reduction in the dosage of those medications. 74<sup>2</sup>70

The Magnesium Research Institute says that the drug Neurontin binds Mg in the GI tract and results in a malabsorption of both oral Mg and Neurontin

(PDR says 24 percent). Interaction with Neurontin is important to note because it is an anti-seizure medication and also frequently used off label as a mood stabilizer and behavioral drug in addition to being used for migraine headaches. Some children with ASD may be on this medication. It is also used in bipolar disorder as an alternative to lithium.

Taking magnesium and mefenamic acid (Ponstel) together may increase the amount of mefenamic acid absorbed, possibly leading to an increase in side effects. Mefenamic acid is a NSAID used for pain and PMS.

38 . Magnesium, Sexuality, Life & Aging There should be no doubt in anyone's mind that we will live healthier, happier and longer lives if we make sure we satisfy completely our body's need for magnesium.

It is sad that we live in a medical world that ignores the evidence that magnesium is crucial for every single function in our own bodies. From the moment we are conceived to the moment we die, magnesium is at the heart of life as is water and air.

Magnesium is important for us from before we are born until our last breath in life. The fact that magnesium diminishes with age and illness should give us a clue to magnesium's vital place in life, health, sexuality, and happiness.

Many scientists believe that hormone-driven mechanisms in the central nervous system should dominate analysis of mammalian behaviors, especially sexuality, because sexuality is primarily hormone-driven. Magnesium is necessary for normal sexual functioning yet is glossed over as important in nervous and endocrine function necessary for good sexual performance. Life, health, longevity, and happiness are related concepts and somehow our sexualities thread in the middle of that. Sex is part of our basic nature because we were created in sex from the union of male and female cells. Whenever sex is fulfilling, the chances of love and a joyful life become greater.

In all likelihood pregnancy cannot be normal unless magnesium levels are adequate. The concentration of magnesium in the placental and fetal tissues increases during pregnancy. The requirements for this element in a pregnant



woman's organism generally exceed its supply; hence, pregnancy should be  
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considered a condition of "physiological hypomagnesemia." 74<sup>21</sup>

Magnesium is found in higher levels in semen than serum.

Orhan Deger from the Ataturk University in Turkey found infertile men had about half the semen magnesium as fertile men.

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The role of magnesium begins its importance when we are in the womb. During pregnancy, magnesium helps build and repair body tissue in both mother and fetus. A severe deficiency during 20

pregnancy may lead to preeclampsia, 74<sup>23</sup> birth defects, and infant mortality. Magnesium relaxes muscles and research suggests that proper levels of magnesium during pregnancy can help keep the uterus from contracting until week 35. Dropping magnesium levels at this point may start labor contractions.

In animal studies it has been shown that magnesium plays a role in ovule maturation, sperm viability, and fertilization. In rats pregnancy cannot be normal unless the food contains an adequate supply of magnesium. Severe or mild deficiencies affect the site of fetal implantation and, if they are prolonged, lead to abortion in the first instance and pathological disorders in the 20

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latter. 74<sup>274</sup>

Some 43 percent of women suffer with sexual dysfunction, compared to 31 percent of men, according to University of Chicago 20

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researcher Dr. Edward Laumann. 74<sup>275</sup> And some \$2-3 billion will be spent within the next ten years on products aimed at improving the sex lives of these women. Female sexual dysfunction is characterized by a lack of desire, arousal, and orgasm. Lack of desire is the chief complaint among women, affecting about one-third of them at some point in their lives, says Cindy Meston, assistant professor of clinical psychology at the University of 20

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Texas at Austin. 74<sup>276</sup>

### Sexual Effects

With magnesium we can expect more energy, strength, stamina, and even increases in sexual energy. Magnesium chloride has a strong local effect, which is easily experienced when applied to sore muscles. Even more pronounced is the effect when we apply magnesium chloride to the mucus membranes.

Dr. Robert Ornstein and Dr. David Sobel, regional directors for preventive medicine for Kaiser Permanente, the world's largest health maintenance organization, say that the physiology of sexual excitement in both men and women depends on the ability of

blood to flow into the genital glands and into the supporting tissues and muscles of the pelvis. They also say that, "It is the full engorgement of blood in the muscles and tissues of the pelvis that eventually triggers orgasm.

"One reason that women in general may be slower to orgasm than men is because they have a far more complex system of arteries, veins, and capillaries in the pelvic area than men that must be fully engorged for orgasm to occur." And in fact pharmaceutical companies, in searching for a female equivalent of Viagra, are focused on developing a drug that increases blood flow to the female genitals, resulting in vaginal lubrication and relaxing vaginal muscles.

“A person who feels uncomfortable with his or her sexuality will unconsciously tense the muscles in the genitals, thighs, anus, and buttocks, preventing the free flow of blood into the area and thereby limiting the possibility for complete arousal. But a person who can relax and allow energy in the form of blood to flow into the pelvic area and genitals will enjoy the sensations of building excitement,” wrote Drs. Ornstein and Sobel.

In men, decreased levels of magnesium give rise to vasoconstriction from increased thromboxane level, increased endothelial intracellular  $\text{Ca}^{2+}$ , and decreased nitric oxide. This may lead to premature emission and ejaculation processes.

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Magnesium is probably also involved in semen transport. <sup>74277</sup>

Magnesium acts peripherally to produce vasodilation. With low doses, only flushing and sweating occur, but larger doses actually will cause a lowering of blood pressure. It is known that magnesium causes nitric-oxide-independent coronary artery <sup>20</sup>

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vasodilation in humans. <sup>74278</sup> Magnesium is thought to behave like a calcium channel blocker at the cellular level, thus it helps to maintain the elasticity of our arteries. Magnesium prevents the deposition of calcium along the arterial wall at points of micro-injury, which is the crucial role it plays in the prevention of both atherosclerosis and arteriosclerosis. Magnesium ions appear to reduce vascular resistance.

Magnesium also is important in the maintenance of healthy muscles. The heart muscle itself benefits from an adequate supply of available magnesium. For these reasons, magnesium is critical to the maintenance of a healthy heart. We would expect the same in all the muscles including those in the pelvic and genital areas.

Low pituitary function may lead to decreased development of the sexual organs, early menopause in women, and impotence in men.

Weak adrenals may reduce the desire and strength for sex and increase sensitivity to stress. Low thyroid may cause a lack of desire or capacity for sex. In men, low testicular function decreases sex drive and sperm production. In women, low estrogen slows sexual maturity, decreases breast size, and retards egg

maturation. Estrogen-progesterone imbalance can create many menstrual cycle variations and symptoms. According to Dr. Mildred Seelig, "The high magnesium content in the spinal fluid is necessary for balancing the stimulant effect of body hormones.

The purpose of thyroid, gonadal, adrenal, and other hormones is to charge up or excite the body. Magnesium and some other substances tend to slow down and relax the system, thus 20

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regulating the hormones and achieving a happy medium." 74<sup>2</sup>79

Thyroid hormone is intimately associated with regulation of energy production and mitochondrial function. Indeed, mitochondria possess thyroid hormone receptors. According to Biotics Research Corporation, enzyme utilization of ATP generated by mitochondria requires complex formation with magnesium, generally in a 1:1 ratio. Magnesium is essential for protein synthesis, cell replication, and activation of the sodium-potassium pump, as well as regulation of calcitonin and 20

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parathyroid hormone. 74<sup>3</sup>70

Pregnancy, Childbirth & Childhood

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Magnesium is needed for reproductive fertility <sup>7431</sup>, <sup>7432</sup> and the use of pharmaceutical contraceptives is known to diminish <sup>20</sup>

magnesium stores in our body. <sup>7433</sup> The rate of premature births <sup>20</sup>

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has increased more than 30 percent since 1981, <sup>7434</sup> but an obvious central cause is ignored by doctors. Magnesium plays a <sup>20</sup>

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crucial role in fertility, pregnancy, <sup>7435</sup>, <sup>7436</sup>, <sup>7437</sup> and in <sup>20</sup>

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early newborn life, <sup>7438</sup> and many of the problems associated with pregnancy and birth can be resolved by magnesium supplementation.

In 1991 Dr. Jean Durlach said, “Primary magnesium deficiency may occur in fertile women. Gestational magnesium deficiency is able to induce maternal, fetal, and pediatric consequences that might last throughout life. Experimental studies of gestational Mg deficiency show that Mg deficiency during pregnancy may have marked effects on the processes of parturition and of post uterine involution. It may interfere with fetal growth and development from teratogenic effects to morbidity—i.e.

hematological effects and disturbances in temperature regulation.

Clinical studies on the consequences of maternal primary Mg deficiency in women have been insufficiently investigated.”

Magnesium is frequently used as the treatment for stopping premature labor and the seizures of eclampsia at the point it starts, but might be more helpful in preventing these if supplemented throughout the course of pregnancy. Dr. Durlach has also shown the increased safety of using magnesium chloride over 20

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magnesium sulfate. 74<sup>3</sup>79 Even worse is the evidence that magnesium deficiency/depletion is involved in the etiology of sudden infant 20 20 20

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death syndrome (SIDS). 74 74 70 , 74 74<sup>1</sup> , 74 74<sup>2</sup> , 74 74<sup>3</sup>

The evidence is clear that inadequate magnesium intake is common during pregnancy and that the plasma levels of magnesium tend

to fall, especially during the first and third trimesters of pregnancy.

Dr. Mildred S. Seelig

In 1987, Dutch researchers found magnesium prevents hemorrhaging in the brains of infants whose mothers have this form of hypertension. Several randomized controlled trials (RCTs) have provided compelling evidence that MgSO<sub>4</sub> (magnesium sulfate) is the drug of choice for maternal seizure prophylaxis in pre-20 20 20

eclampsia, whether preterm or term. 74 74 74 Scientists have shown that giving magnesium sulfate to pregnant women may greatly reduce the incidence of cerebral palsy in infants born weighing less than 3.3 pounds. These low-birth-weight infants are 60-75

times more likely to develop cerebral palsy than babies that reach a normal weight before birth—and the number of children with cerebral palsy is

growing. In studies done, another surprising outcome was the reduction of mental retardation when 20 20 20

magnesium was provided during pregnancy. 74 74 75

## Magnesium & Asthma

Increasingly we see evidence of the effects of magnesium deficiency in childhood, which collide with other factors like exposure to toxic chemicals and the violent chemical invasions offered by vaccines. Dr. Allan Becker at the University of Manitoba looked at 14,000 boys and girls born in 1995 and found that as many as 14 percent had asthma. “We’re talking about one in seven children—that’s a huge proportion of the pediatric population,” Becker says. “It’s in every classroom, every school, and many, many families. It’s huge.” This reality is reflected in the population at large. Asthma affects about three million people in this country, six out of 10 of whom do not have control of their disease, according to the Asthma Society of Canada. It kills 500 people in Canada each year and 5,000 in the U.S.

Meanwhile, the World Health Organization says 150 million people around the world have asthma and over 180,000 die annually as a result of it.

The relationship between asthma and allergies is a strong one.

Asthma is often triggered by allergies of all kinds—food allergies, pollutants, dust, mold, chemicals and pharmaceutical drugs. Magnesium losses are notorious for occurring as a result of the drugs used specifically for asthma that open airways and reduce inflammation. Magnesium is known to help relieve bronchospasm, or constricted airways in the lungs, and has been used intravenously to help relieve the symptoms of life-threatening, drug-resistant asthma attacks and to diminish the 20 20 20

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effects of asthma drugs used. 74 74 76 , 74 74 77

Research published in the American Journal of Epidemiology in 2002 shows that when the diets of 2,566 children ages 11-19 were studied, less

than 14 percent of boys and 12 percent of girls had adequate intakes of magnesium and low magnesium intake was

associated with lower measures of several lung functions 20 20 20

(including lung capacity and airway flow). 74 74 78 “Magnesium deficiency definitely accentuates the allergic situation,” says Terry M. Phillips, D.Sc. Ph.D., director of the immunogenetics and immunochemistry laboratory at George Washington University Medical Center in Washington, D.C. and author of *Winning the War Within* .

In a study conducted at Brigham Young University in Provo, Utah, researchers found that laboratory animals severely deficient in magnesium had much higher blood levels of histamine when exposed to substances that trigger allergies than animals getting 20 20 20

sufficient magnesium. 74 74 79 “The flow of calcium into and out of a cell helps regulate some cell function,” explains Dr. Kay Franz, one the study’s authors. “So it’s possible that a magnesium deficiency changes the permeability of mast cell membranes, allowing calcium to more easily enter cells. When that happens, histamine is released. In animals, magnesium deficiency causes the release of substances that can act on immune cells such as mast cells and basophils and make them hyperactive—more likely to release histamine,” he says. Magnesium deficiency also causes other immune responses in the body that can lead to severe and 20 20 20

sometimes lethal consequences. 74 75 70

## Death & Dying—End-of-Life Issues

Magnesium deficit may participate in the clinical pattern of aging—neuromuscular, cardiovascular and renal symptomatology.

In general, as we age our tendency to compounded accumulative magnesium deficiency only rises, leaving us increasingly vulnerable to a wide range of disorders and, in the final analysis, to a miserable death. Cellular senescence is the phenomenon where cells lose their ability to



divide in response to DNA damage. Cells either senesce (deteriorate with age) or self-destruct (apoptosis) if the damage cannot be repaired.

Organismal senescence is the aging of whole organisms and is generally characterized by the declining ability to respond to stress, increasing homeostatic imbalance and increased risk of disease. Because of this, death is the ultimate consequence of aging. All physiological processes deteriorate in the face of magnesium deficiency, vastly accelerating the aging process and hastening premature death.

Magnesium treatment has been repeatedly shown to reduce the incidence of both temporary and permanent noise-20 20

induced hearing loss 74 75<sup>1</sup> and supplementation is now being 20 20

found to significantly improve acute-onset hearing loss. 74 75<sup>2</sup>

Dr. Mildred Seelig postulated that magnesium deficiency early in life gives rise to chronic abnormalities that persist throughout life, increasing morbidity and mortality and shortening life.

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74 75 <sup>3</sup> “Little attention has been paid to special Mg needs of old people, to whether Mg inadequacy might contribute to the aging process, or to whether Mg supplementation might have any 20 20 20

beneficial effects in the aged.” 74 75 74

Dr. David Killilea noted that few studies have investigated long-term magnesium deficiency in isolated cells throughout their entire lifespan. In his research he found that cells’ replicative capacity was decreased with magnesium deficiency and that the changes were not related to increased cell death (apoptosis) and that there was altered sensitivity to oxidative stress and changes in mitochondrial physiology. He concluded that magnesium deficiency alters cellular and mitochondrial function and accelerates the senescent phenotype and may promote or exacerbate 20 20 20

age-related disease. 74 75 75 Others interested in the aging process, like Dr. Norman Shealy, have given us much information on the values of transdermal magnesium therapy because his experience is that transdermal application of magnesium chloride alone has the ability to raise an important marker of aging—DHEA levels.

It is widely researched and recognized that magnesium deficiency commonly occurs in critical illness and correlates with a higher mortality and worse clinical outcomes in the intensive care unit 20 20 20

(ICU). 74 75 76

Stress factors particularly likely to be encountered by the aged include chronic anxiety , worry , and the acute stress of bereavement. Regardless of the cause, stress increases catecholamine and corticoid release, which in turn causes magnesium loss. Catecholamines also increase myocardial Ca uptake (Nayler, 1967). Since low Mg/Ca ratios increase catecholamine secretion (Baker and Rink, 1975), a vicious cycle is thus established when Mg deficiency preexists. Well accepted is the contributory role of stress to cardiovascular disease, including sudden unexpected cardiac death. Less well-known is the role of Mg loss in the damage caused by stress. Long-term suboptimal Mg intake, to which adaptation had taken place so that signs of deficiency that were present earlier no longer existed, resulted in decreased tolerance of stress and shortened life expectancy 20 20 20

(Heroux et al., 1973). 74 75 77

Some of the principle causes of Mg deficiency in aging and critical illness are gastrointestinal and renal losses. As we age our kidneys lose their efficiency at regulation of magnesium and maintaining the necessary balance. Our ability to tolerate normal 20 20 20

everyday stressors may decrease, we may lose our teeth , 74 75 78 and our ability to take in and digest food properly. When magnesium intake is curtailed or when there is intestinal magnesium malabsorption, the normal kidney reduces magnesium excretion to

very low values in an attempt to conserve magnesium. But, when renal magnesium handling is impaired, hypomagnesaemia ensues because, unlike with calcium, equilibration with cellular stores does not occur for several weeks.

In humans, magnesium absorption decreases with age. Around the age of 70 it becomes two-thirds of what it usually is at around the age of 30.

Exchangeable pools of magnesium are reduced in elderly patients.

Iatrogenic secondary magnesium deficit is especially important as there is an over-consumption of prescribed drugs among elderly patients, many of which deplete magnesium. Through primary and secondary magnesium deficiency and depletion, aging correlates strongly with increasing magnesium deficits.

Pain from any number of conditions may interfere with appetite and exercise and may contribute to poorer intake of a proper diet. Magnesium can be helpful in relieving pain of all types, both chronic and acute. Magnesium acts as a noncompetitive antagonist of the N-methyl-D-aspartate receptor, which has been implicated in the transmission of pain, according to Dr. Vincent Crosby and colleagues at Nottingham City Hospital. The researchers gave either 500 mg or one gram of a solution of magnesium sulfate intravenously to 12 cancer patients who were in pain despite the use of strong opioids and other drugs.

Patients receiving 500 mg of magnesium experienced pain relief for up to four hours, with three patients reporting complete relief, two patients reporting partial relief, and only one patient reporting no relief. Patients receiving one gram of magnesium also reported varying degrees of pain relief that 20 20 20

lasted up to four hours. 74 75 79

Many people needlessly suffer pain

because they don't get enough magnesium.

Dr. Mildred Seelig

Dr. Saul Pilar, a general practitioner in Vancouver, has seen magnesium lessen pain and spasms, reduce fatigue, and improve sleep. “My aim is that 100 percent of my patients get enough magnesium either from food or supplements,” he says. “I am optimistic that in the future more attention will be paid to this essential mineral.” Compassionate intelligent medicine surely would put magnesium supplementation first in terms of all medications. The fact that it is last speaks volumes about the level of compassion and intelligence in modern allopathic medicine.

39 . Testing & Estimating Magnesium Levels If you doubt anything about your health you should doubt your cellular magnesium levels. Though you will still see many

statements indicating that magnesium deficiency is rare, don't believe it for a moment. Even some of the sites that offer magnesium testing say this, but it is based on the fact that the most popular magnesium test is for blood serum levels. Since magnesium is mainly an intracellular ion, measurement of total serum magnesium is an inaccurate index of intracellular or total magnesium stores. This means that although your serum levels may be maintained within normal limits, there could be a deficiency in tissues that is not being detected. Blood serum tests will almost always show normal no matter what the magnesium levels are in the cells. The body tightly controls the level of magnesium in the blood because if that level falls, a heart attack is never that far away.

Serum levels of magnesium must be kept within a tight range or the heart stops. Therefore serum levels are maintained at the expense of levels inside cells.

Dr. Sarah Myhill

When it comes to magnesium it is foolish to place all our faith in tests, especially the blood serum test. Less than one percent of our body's total magnesium can be measured in our blood; the rest is found in the cells and tissues of the body where it is needed for crucial cell processes. So it's impossible to make a diagnosis about magnesium levels this way, for magnesium in the blood does not correlate with magnesium levels in the rest of the body. In fact, when we are under stress, our body dumps

magnesium into the blood giving the mistaken appearance of normal levels even when the rest of the body is terribly deficient. This is just one more reason to be wary of doctors, clinics, and hospitals that continue to rely on a totally irrelevant magnesium test.

Many doctors implore you to obtain an accurate diagnosis before trying to find a cure. They like to remind you that many diseases and conditions share common symptoms: if you treat yourself for the wrong illness or a specific symptom of a complex disease, you may delay legitimate treatment of a serious underlying problem.

In other words, the implication is that the greatest danger in self-treatment may be self-diagnosis. If you do not know what you really have, you cannot treat it!

This is a lot of nonsense and mirrors a medical system that has lost contact with reality. When it comes to magnesium and its deficiency we can safely assume that we are deficient to one degree or another, even if we feel perfectly healthy. The chances today of running through life with a full tank of magnesium without any kind of supplementation are about zero. Perhaps the five percent of the population who eat organically and supplement with superfoods like spirulina, wheat grass juice, and sea vegetables like the Japanese eat will not be deficient. However,

if you are presently ill, chronically or otherwise , the chances are probably close to zero that you are not deficient.

Way back in 1936 testimony was already being put before the American Congress about how the food we were eating was starving us of basic nutrients. Over 70 years later, the situation is far worse and the basic picture is frightening; this is being reflected in the explosive growth of chronic diseases in the old and the young.

No man, woman, or child today can eat enough fruits and vegetables to supply their bodies with enough magnesium for perfect health. There has been a gradual decline of dietary magnesium in the United States, from a high of 500 mg/day at the 20 20 20

turn of the last century to barely 175-225 mg/day today. 74 76 70

Both MIT and the National Academy of Sciences have determined that there are vast deficiencies in the American population. When you consider that the Recommended Daily Allowance (RDA) is severely underestimated for magnesium, it becomes clear that almost 100 percent of the population would be magnesium deficient.

But still the most common question people who become aware of magnesium want to know is how do I know if my body is magnesium deficient? In addition to the above factors one should also consider the fact that if you are under mild to moderate stress caused by physical or psychological disease, physical injury, athletic exertion, or emotional upheaval, your requirements for 20 20

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magnesium escalate. 74 76<sup>1</sup> , 74 76<sup>2</sup> Today, who is not under increasing stress?

Actually one of the best ways to determine if you are magnesium deficient is to start applying magnesium chloride transdermally to the body in low doses and to see if, within days or perhaps hours, you feel better. Often conditions that are marked by pain will show improvement almost immediately as the magnesium ions penetrate through the skin. Though as we see from the testimonial below, if you are intensely deficient you might feel discomfort when applying the magnesium chloride at first.

When I first began applying magnesium directly onto my armpit, it would burn intensely for a period of time and then stop. However, I was also amazed to discover that I emitted no body odor after doing this, even when I'd sweat. So I decided to endure the pain for the benefits that I knew were happening. But the pain was indeed intense, and appeared to last for a longer duration, to the extent that I finally dialed back the concentration, mixing magnesium with energized water in a 50/50 solution. This lessened the pain, but didn't end it.

When one is underwater too long and comes up for air, that first deep breath is deeply appreciated by the total organism that we are. In reality it's not that much different with magnesium.

After years if not decades of deficiency, the body responds quite

powerfully to the systemic application of magnesium. When taking a bath in magnesium chloride or when applying it directly to the skin, the body receives the magnesium in a way that is only approached by intravenous treatments.

No one would wait for a doctor's permission or for a long and expensive diagnostic process to take that first life-saving breath. There is no reason for anyone to wait to add more magnesium into their body. In today's toxic world the most basic condition that leads to disease is the one-two punch of dietary deficiency faced with rising levels of toxicity in the body.

Everyone is exposed to dangerous chemicals that are penetrating and accumulating in the body. When there is not enough magnesium along with other vital minerals and nutrients, the body just cannot handle the increasing toxicity. This is too simple for doctors addicted to the pharmaceutical companies that actually want you to increase the overall toxicity of your body by taking more of their toxic drugs.

If you still want to test for magnesium deficiency there are other tests besides the blood serum test: Total Red Cell Magnesium. The results of this test are less variable than serum measurements, but it may still not adequately reflect total body magnesium status in health and disease. This test measures the amount of the mineral magnesium inside the red blood cells. However, total red blood cell magnesium levels are not as accurate a measurement of tissue levels as the ionized magnesium test.

Ionized Magnesium. The blood ionized magnesium test correlates well with intracellular free magnesium levels. Dr. Carolyn Dean favors the blood ionized magnesium test saying it is a very refined procedure backed by results on many thousands of patients and information about it has been published in prestigious journals.

Intracellular Free Magnesium. Nuclear magnetic resonance (NMR) spectroscopy is another way to test for magnesium but is impractical because of the cost and the lack of routine availability.

Sublingual Magnesium Assay. The Buccal cell smear test or

“Exatest” is a safe, non-invasive test that accurately measures the minerals inside cells. This is a test used, for example, during cardiac surgery to determine cellular magnesium levels. A doctor painlessly collects a sample from under your tongue and affixes it to a slide. The slide is then sent to IntraCellular Diagnostics, Inc. for analysis.

Magnesium Loading Test. This test measures urinary magnesium excretion in response to a loading dose of magnesium. Although inconvenient to perform, this test has successfully identified individuals with even mild degrees of magnesium deficiency. It

has been considered an accurate test when renal function is normal.

The ultimate and most dependable indicator of magnesium deficiency is your health. Yet, if the Standard American Diet is your primary source of nutrition, you can be assured that the magnesium stores in your body will steadily decline. If you drink alcohol, rest assured that will further push you into magnesium deficiency and this will be reflected in your state of health.

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74 76 <sup>3</sup> So if any of these factors are true, then you need to replenish your magnesium stores, irrespective of what any tests say.

40 . Magnesium & Stress, Depression, Violence Stress is increasing in our world across the board. Many are feeling threatened on financial and economic levels with many millions in danger of losing everything. Anxiety and insecurity are increasing in a population already weakened by chemical, heavy metal, and pharmaceutical assault, all of which often lead directly to emotional, mental, and spiritual duress of intense proportion.



Dr. Gary G. Kohls, an expert on the effects of trauma, violence, and stress on physical and mental wellbeing, describes some of the worst-off in terms of mental and emotional stability; we should know that this kind of stuff is present in the mainstream of society—though it may not be visible to us. Kohls says, “Tens of millions of innocent, unsuspecting Americans who are mired deeply in the mental “health” system have actually been made crazy by the use of, or the withdrawal from, commonly-prescribed, brain-altering, brain-disabling, indeed, brain-damaging psychiatric drugs that have been, for many decades, cavalierly handed out like candy—often in untested and therefore unapproved combinations of drugs—to trusting and unaware patients by equally unaware but well-intentioned physicians who have been under the mesmerizing influence of slick and obscenely profitable psychopharmaceutical drug companies, aka, Big Pharma.”

This patient population is suffering from massive magnesium deprivation and the medical system makes sure it stays that way.

With most of these psycho-pharmaceutical drugs hammering magnesium levels into the ground we have a very sad situation that is repeated across the universe of patients suffering from both acute and chronic diseases. Dr. Kohls concludes, “The truth is that most, if not all, of Big Pharma’s psychotropic drugs are lethal at some dosage level (the LD50, the lethal dose that kills 50 percent of lab animals, is calculated before efficacy testing is done), and therefore the drugs must be regarded as dangerous.

The chronic use of these drugs is a major cause of cognitive disorders, brain damage, loss of creativity, loss of spirituality, loss of empathy, loss of energy, loss of strength, fatigue, permanent disability, and a multitude of metabolic adverse effects that can readily sicken the body, brain and soul

by causing insomnia or somnolence, increased depression or anxiety, delusions, psychoses, paranoia, mania, etc.”

Today we are also threatened with the growing reality of food scarcity that will drive down magnesium levels, sending us into a downward spiral of deteriorating health. The quality of foods of modern man has already been trashed and now the knockout punch will be delivered via diminishing quantity. We are under more stress with less ability to deal with it primarily

because of magnesium deficiencies. There is no doubt in my mind that those who understand the need for, and respond with heavy use of, magnesium oil will endure much more easily in today's hostile and stressful world.

Radiation, chemicals, and heavy metals also put enormous stress on organs, tissues, and cells and thus on us as human beings. The profiles of these toxic insults include effects to emotional, mental, and spiritual dimensions because it is really difficult to be weakened and poisoned and remain happy and healthy.

Magnesium mediates a good part of our body's ability to deal with and remove such toxic insults. Toxicities actually increase as magnesium levels fall because magnesium is that important in every process of chelation and detoxification of heavy metals and foreign chemicals.

In this Age of Toxicity we have, since our conception, been subjected to increased radiation exposure from medical tests, constant microwave exposure, and strong increases in environmental background radiation that has increased because of the American military's passion for depleted uranium weapons that are used on every major battlefield in modern times.

Mg deficiency increases susceptibility to the physiologic damage produced by stress. The adrenergic effects of psychological stress induce a shift of Mg from the intracellular to the extracellular space, increasing urinary 20 20

excretion and eventually depleting body stores. 74 76 74

Dr. Leo Galland

Recently the British Journal of Psychiatry published that people with a diet heavy in processed food had a 58 percent higher risk of depression. What they didn't say was that the reason for the depression was lack of dietary magnesium in such diets and that depression can best and most easily be treated with magnesium.

They state that a “whole food” diet protects against depression because of the combined effect of consuming nutrients from lots of different types of food, rather than the effect of one single nutrient. Though there is a glint of truth to this statement, it

hides the well-researched reality that it is magnesium levels that provide the key to our mental and emotional states.

In today’s stressful world, magnesium levels get driven further down. Not only does the stress eat up our magnesium stores at an accelerated pace but how we deal with our stress is also affected. For instance it’s generally understood that liquor sales spike during an economic slump. According to a recent poll by Gallup, Americans are downing more booze—67 percent of Americans report that they consume alcohol on a regular basis.

Increased alcoholic intake, which happens frequently in times of stress for some people, depletes magnesium in our bodies. Alcohol increases urinary magnesium excretion by as much as 260 percent above baseline values; this occurs within minutes of ingestion.

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74 76 75 Often by increasing magnesium, the perceived need for alcohol decreases while some of the depression and anxiety are alleviated.

The truth and facts about magnesium are well known by researchers around the world. Magnesium is one of the most well-studied nutrients and smart doctors reach for it quickly for patients suffering from heart attacks or strokes. We would have an entirely different world if governments got behind magnesium supplementation. People would be healthier and happier, would miss fewer days of work, would be less stressed, and would be able to work harder and enjoy life more. The world’s medical bills could be reduced by trillions of dollars.

Pharmaceutical companies, especially, don’t want us to know anything about using simple minerals to help depression, reduce violence, reduce stress, or stay healthy and out of the doctor’s office or the hospital. Since the arrival of selective serotonin reuptake inhibitors (SSRIs) and atypical

antipsychotics on the market, countless studies have shown the so-called “new generation” of psychiatric drugs to be ineffective and dangerous, yet exceptionally profitable. There is no such thing as a substitute for the mineral magnesium.

Worldwide, sales of anti-psychotics went from \$263 million in 1986 to \$8.6 billion in 2004, and antidepressant sales went from \$240 million in 1986 to \$11.2 billion in 2004. For these two classes of drugs combined, sales went from \$500 million in 1986

to nearly \$20 billion in 2004, a 40-fold increase, according to 20 20 20

Robert Whitaker, best-selling author of *Mad in America*. 74 76 76 And God only knows how high these numbers have risen in the year 2010

when stress and mental and emotional disturbances are going off the charts.

Despite a dramatic increase in treatment of psychiatric disorders during the past 10 years, there has been no decrease in the rate of

suicidal thoughts and behavior among adults, according to a federal

study primarily funded by the National Institute of Mental Health.

The Washington Post

The Department of Family Medicine, Pomeranian Medical Academy, states that dietetic factors can play a significant role in the origin of ADHD and that magnesium deficiency can result in 20 20 20

disruptive behaviors. 74 76 77 A significant number of researchers have shown that as much as 60-90 percent of illnesses are directly caused or exacerbated by stress. And in fact, numerous studies have shown that stress is related to major illnesses like heart disease, high blood pressure, and diabetes.

There is now little question that stress can kill, meaning that magnesium deficiencies can put you in your grave. Harvard physiologist Walter Cannon

recognized 90 years ago that when confronted by a threat—physical or emotional, real or imagined—

the body responds with a rise in blood pressure, heart rate, muscle tension, and breathing rate. We now know that this physiological “stress response” involves hormones and inflammatory chemicals that can foster everything from headaches to heart attacks in overdose.

Patients who had made suicide attempts (by using either violent or nonviolent means) had significantly lower mean CSF (cerebrospinal fluid) magnesium 20 20 20

levels irrespective of the diagnosis. 74 76 78

In recent years we’ve seen an increase of all kinds of weird violence as magnesium levels are driven lower and lower. Almost every week now we hear reports of people walking into schools in China stabbing teachers and children, and also in America mass killings are slaughtering people, and the fact that most of these assaulters are on pharmaceutical medications that drive their magnesium levels to the bottom is seldom revealed.

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In February of 2006 the New York Times 74 76 79 reported that,

“While violent crime has been at historic lows nationwide and in cities like New York, Miami, and Los Angeles, it is rising sharply in many other places across the country. And while such crime in the recent past was characterized by battles over gangs and drug turf, the police say the current rise in homicides has been set off by something more bewildering: petty disputes that hardly seem the stuff of fistfights, much less gunfire or stabbings. Suspects tell the police they killed someone who

‘disrespected’ them or a family member, or someone who was ‘mean

mugging’ them, which the police loosely translate as giving a dirty look.

“Police Chief Nannette H. Hegerty of Milwaukee calls it ‘the rage thing’,” the Times reported, “We’re seeing a very angry population, and they don’t go to fists anymore, they go right to guns,” she said. “When we ask, ‘Why did you shoot this guy?’

it’s, ‘He bumped into me,’ ‘He looked at my girl the wrong way,’”

said Police Commissioner Sylvester M. Johnson of Philadelphia.

“It’s not like they’re riding around doing drive-by shootings.

It’s arguments—stupid arguments over stupid things.” While arguments have always made up a large number of homicides, the police say the trigger point now comes faster. In robberies, Milwaukee’s Chief Hegerty said, “Even after the person gives up, the guy with the gun shoots him anyway. We didn’t have as much of that before.”

What could be driving such a surge in violence? We can easily suspect that with a reported severe magnesium deficiency in 70

percent of the American population, we may be seeing the effects of this deficiency. The two most basic requirements for the normal operation of our brain are a sufficient energy supply and an optimal presence of biochemicals involved in transmitting messages. Magnesium is crucial in the production of both energy and neurotransmitters, not to mention the integrity of the blood-brain barrier. It is bedrock science that connects magnesium to 20 20 20

neurological disorders. 74 77 70

Magnesium deficiency causes serotonin-deficiency with possible resultant aberrant behaviors, 20 20

including depression, suicide or irrational violence. 74 77<sup>1</sup>

Paul Mason

Magnesium of course is not the only nutrient whose deficiency is leading to broad problems of mind and emotion. Zinc is also an important mineral and

is involved with psychiatric disorders.

Over 90 metallo-enzymes require zinc and the functioning of the brain is dependent on adequate levels of zinc. Deficiency can cause amnesia, apathy, depression, irritability, lethargy, mental retardation, and paranoia. As it is for magnesium and zinc, it is for a host of basic nutrients, though it is the mineral deficiencies that often hold the key.

Numerous studies conducted in juvenile correctional institutions have reported that violence and serious antisocial behavior have been cut almost in half after implementing nutrient-dense diets.

Dennis E. Fink writes, “Although many people think we know a lot about what causes violent personalities, I think we really do not

understand this area well at all. Our mental functions seem to be under assault more and more every day, and the assault on our brains is likely to lurk behind some of the increased violence that we are seeing across America. Some of these onslaughts are from the toxins that surround us and are difficult to avoid.”

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74 77 <sup>2</sup> It is a complex matrix of causes that cuts across physical, emotional, mental, and spiritual levels of being, meaning the blame for violence and depression cannot be laid solely on nutritional causes but nutritional causes are the easiest thing to correct. Unfortunately removing toxins from our environment and food is not.

It is clear though that magnesium deficiency or imbalance plays a role in the symptoms of mood disorders. Observational and experimental studies have shown an association between magnesium 20 20

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and aggression, 74 77<sup>3</sup> , 74 77 74 , 74 77 75 , 74 77 76 , 74 77 77 anxiety,  
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74 77 79 , 74 78 70 ADHD, 74 78 <sup>1</sup> , 74 78 <sup>2</sup> , 74 78 <sup>3</sup> , 74 78 74 bipolar  
disorder, 74 78 75

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, 74 78 76 depression, 74 78 77 , 74 78 78 , 74 78 79 , 74 79 70 and  
schizophrenia.

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74 79 <sup>1</sup> , 74 79 <sup>2</sup> , 74 79 <sup>3</sup> , 74 79 74

Children are more vulnerable to the dangers of toxic pollution than are adults, according to Herbert L Needleman, M.D. and Philip J. Landrigan, M.D., authors of Raising Children Toxic Free

. Everyone who is magnesium deficient has a compromised system of detoxification and is more vulnerable to neurotoxins that are increasingly present in our foods and environment.

Yet as Evelyn Pringle lets us know, “Pharma will stop at nothing when it comes to making money off children. On April 25, 2005, the Ohio Columbus Dispatch reported an investigation of state Medicaid records that found 18 newborn to 3-year-old babies in Ohio had been prescribed antipsychotic drugs in July 2004.” It is a horrible crime and terrible sadness what is being done to the children by pediatricians and psychiatrists who live by the increasingly popular creed to drug the kids with toxic substances.”

When the body of a 19-year-old student, Traci Johnson, was found hanging from a shower rod in the laboratories of pharmaceuticals giant Eli Lilly, US officials were quick to announce that the death could not be linked to a new 20 20 20

anti-depressant drug she was helping to test. 74 79 75

And even more recently came the report of the suicide of a young man who, suffering from acute psychosis, was recruited into a clinical trial where he was improperly treated with an antipsychotic drug (Seroquel) that did not help him. Because of the clinical trial’s design, he was not permitted to change 20 20 20

medication to something more effective. 74 79 76 This poignantly points up the fact that the system of clinical research has been

thoroughly co-opted by market forces, so that many studies have become little more than covert instruments for promoting drugs.

Magnesium ions have nutritional and pharmacologic actions that safely protect against the neurotoxicity of many agents up to and including stress from environmental noise and physical trauma.

Magnesium deficiency, even when mild, increases susceptibility to various types of neurological and psychological stressors in both animals and healthy human subjects.

Linus Pauling may be the father of nutritional medicine and it was he who first “highlighted the supremacy of nutrition in correcting abnormalities in the chemical environment of the brain.” Nutrients like ascorbic acid, thiamin, niacinamide (vitamin B3), pyridoxine, vitamin B12, folic acid, magnesium, glutamic acid, and tryptophane were presented by Dr. Pauling as intimately linked to brain function and mental illness. In addition to maintaining strong bodies, good nutrition helps us keep our mental health and emotional stability. With the proper diet containing the right nutrients in correct amounts, symptoms of mental illness can be rolled back and treated. Deficiencies in certain necessary nutrients lead to psychotic symptoms and depression while supplementation of other nutrients help attenuate and improve the symptoms of mental illness.

For all the talk about protecting children in America, too many of our little ones are threatened by psychiatrists and psychologists who have betrayed them. Millions of children are now taking psychotropic drugs that are causing catastrophic problems that are going unreported. For a tragic trip into the violent hell these drugs are causing, please read Evelyn Pringle’s “FDA Forgot A Few ADHD Drug Related Deaths and Injuries” at:

<http://usa.mediamonitors.net/content/view/full/27099>

The medical and educational establishments are conducting a skyrocketing campaign to get kids and their parents to “just say yes” to brain-altering pharmaceuticals, with the drug of choice being Ritalin, even though some report that Ritalin is a drug 20 20 20

that has a more potent effect on the brain than cocaine. 74 79 77

On top of everything, the Children's Hospital of Philadelphia said that 19 percent of newly diagnosed type 2 diabetic children also have neurological diseases . Many of these children are being treated with the psychiatric medications: Zyprexa, Risperdal, Geodon, Seroquel, Clozaril, and Abilify. All of these drugs carry black box warnings to alert MDs about the dangers of diabetes. Magnesium should be substituted for these drugs not only because it is very effective in relieving neurological disorders but also because it is a primary agent for the prevention and treatment of diabetes.

Do not, and I scream, do not trust psychologists, psychiatrists,  
and the current drug-pushing culture of education.

Dr. Julian Whitaker

There is an international explosion of legal child-drugging as parents, educators, and politicians en masse have been thoroughly duped into believing that only by continuous heavy drugging from a very early age can the “affected” child possibly make it through life's worst challenges.

Teen suicides have tripled since 1960 in the United States. Today suicide is the leading cause of death (after car accidents) for 15-24-year-olds. Since the early 1990s millions of children around the world have taken antidepressants that health authorities are just now branding as suicidal agents. This is the other side of magnesium deficiency—the nightmare of these drugs that only compound and worsen the loss of magnesium from the body.

The scene has been long in the making for the patterned onslaught of psychiatry on the young. Psychiatry has only in the last two decades unleashed its devastating attack on children by way of chemical weapons—highly-profitable, addictive, psychotropic drugs posing as medication—thereby creating a generation of drug addicts before they've even reached adulthood.

Child psychiatrists are one of the most dangerous enemies, not only of children but also of adults. They must be abolished.

Dr. Thomas Szasz, Professor of Psychiatry According to Dr. Sydney Walker, author of The Hyperactivity Hoax

, “Thousands of children put on psychiatric drugs are simply smart. These students are bored to tears and people who are bored fidget, wiggle, scratch, stretch, and (especially if they are boys) start looking for ways to get into trouble.” What this chapter adds to that is the underlying complication these children face when their magnesium levels are too low and the devastation that rains down on them in the form of psychiatric medications.

If we look at the whole picture, what do we see? Children are born under medical stress with unnatural procedures and drugs, they are then vaccinated, i.e. bombarded with chemicals, they are dosed out with antibiotics, they eat nutritionally-deficient food, they watch inordinate amounts of television, they suffer through educational curriculums that, to them, have no relevance in their lives, they undergo exposure to thousands of chemical poisons in the environment and at home, they get more vaccines, they stuff their faces to the point of obesity while suffering from malnutrition, only to have to suffer through being further drugged by psychiatrists for becoming the mess they have become.

Psychiatrists and psychologists should know better because of their training in mind and emotion. It is a terrible betrayal of humanity to see them turn into drug dealers. The pharmaceuticals that the drug companies produce for these mental healthcare workers are as dangerous as any of the drugs sold by dealers on the streets. Magnesium should be substituted for these drugs not only because it is more effective in relieving neurological disorders but also because it is vastly safer than any pharmaceutical.

I practiced neurology and psychiatry for 30 years, but found to my chagrin that it was largely a huge fraud, despite the fact that most of the doctors I met had the best intentions. They were simply brainwashed.

Dr. Allen Greenberg

1. Testimonials on Depression & Magnesium In 2000, the National Institute of Health (NIH) listed depression as a sign of magnesium deficiency. NIH defined magnesium deficiency symptoms as having three categories: Early symptoms include one or more of: irritability, anxiety (including obsessive-compulsive disorder [OCD] and Tourette syndrome), anorexia, fatigue, insomnia, and muscle twitching.

Other symptoms include apathy, confusion, poor memory, poor attention, and reduced ability to learn.

Moderate deficiency symptoms can consist of the above and possibly rapid heartbeat, irregular heartbeat, and other cardiovascular changes (some being lethal).

Severe deficiency symptoms can include one or more of the above symptoms; or more severe symptoms including full-body tingling, numbness, a sustained contraction of the muscles along with hallucinations and delirium (including depression), and finally, dementia (Alzheimer's disease).

Repletion of magnesium deficiency typically reverses any increased stress sensitivity, and pharmacologic loading of magnesium salts orally, parenterally, or transdermally induces resistance to neuropsychological stressors.

Mild magnesium deficiency appears to be common among patients with disorders considered functional or neurotic and appears to contribute to a symptom complex that includes asthenia, sleep disorders, irritability, hyper arousal, spasm of striated and smooth muscle, and hyperventilation.

“If the NIH knows this, why don't doctors use magnesium to treat depression and other mental (and physical) disorders?” asks

George Eby, the developer of [www.coldcure.com](http://www.coldcure.com) and who successfully treated himself with magnesium for depression. Here is Eby's take on depression and his story: Depression is an extremely common condition that affects more than one in 20 people in any one year in Western society.

Depression may be expressed as one of several hyperemotional states. A sudden loss of interest in life combined with a feeling of worthlessness may be associated with depression.

Normally joy, sadness, and grief are parts of everyday life.

While a short period of depression in our response to daily problems is normal, a long period of depression and sadness is abnormal.

Most depressive episodes are triggered by a stressful personal event such as loss of a loved one or change of circumstances, and depression over a short period is a normal coping mechanism.

Long-term, stress-induced depression often results when magnesium levels fall to dangerously low levels in the body. One of the reasons it does this is because the stress itself depletes already meager cellular magnesium stores.

I remain truly amazed at the tremendous benefits of magnesium in treating and preventing depression. In particular, I see magnesium as an important research topic for survival, considering its limited availability from our Western diets and due to its ability to inexpensively cure and prevent many expensive diseases, life-threatening or not.

I know how bad depression can be because I spent September 1999

through April 2000 in a clinical depression that worsened from the beginning. By Christmas the depression suddenly became much worse, nearly suicidal in intensity, and remained that way for four more months. Never did I think that things could go so wrong with my biochemistry that it would cause me to have suicidal thoughts and tendencies. How wrong I was. I had been taking Zoloft (an antidepressant) since 1987, which seemed to take care of my depression. I lived on Zoloft, but by September of 1999, it had stopped working—and I knew that something was really wrong.

My depression was preceded by many years of major stress from overwork, anxiety, hypomania, fibromyalgia, infrequent panic attacks, anger, stress, poor diet, overwhelming emotional feelings, night time muscle spasms, paranoia, asthma, and prickly sensations in my hands, arms, chest,

and lips. I wanted to sleep all day and had trouble getting up in the mornings. Occasionally my lips felt that they were going to vibrate or tingle off my face. About ten years ago, I had a very painful bout with calcium oxalate kidney stones, a recognized sign of magnesium deficiency.

A few weeks before, in January of 2000, I was hospitalized, I had very low energy, mental fogginess, depression with strange suicidal thoughts, and I was under enormous stress.

Now I can recognize these “mental” symptoms as symptoms of magnesium deficiency and/or calcium toxicity. I was put on nearly every antidepressant drug known and had severe side effects to all of them and felt sicker and sicker. None worked. I lost a lot of weight, and I was extremely constipated. I also had a cardiac arrhythmia.

On April 12, 2000, I looked like I was dying to several people important in my life. My psychiatrist agreed and took me off all antidepressant medications and put me on a tiny amount of lithium carbonate (150 mg twice a day). Shortly later, I picked up a 1975

copy of Nutrition Almanac (McGraw-Hill Book Company, New York) and happened to open it to the magnesium section. I was interested to find that magnesium was low in the serum of people who were suicidal and depressed. The article indicated that magnesium dietary supplements had been effective in treating depression. Also, a person with a magnesium deficiency is apt to be uncooperative, withdrawn, apathetic, nervous, and have tremors

—essentially lots of neurological symptoms associated with depression.

Just a few months previous to the onset of my depression, I had been hospitalized for chest pain, cardiac dysrhythmia, and an inability to take in more than about one-fifth my normal breath.

The hospital found no cardiac problems, and the internist gave me an IV drip of magnesium sulfate solution. A few hours later all of those symptoms vanished as rapidly as they had come. What I was beginning to see was that nearly all illnesses in my adult life were magnesium-deficit-related.

So finally I made the decision to start taking magnesium at a level three times the 400 mg/day RDA for magnesium, with 400 mg in the morning, 400 mg mid afternoon and 400 mg at bedtime. I used Carlson's chelated magnesium glycinate product (200 mg magnesium elemental). Within a few days to a short week, I felt remarkably better, my depression lifted noticeably, but I was getting a bit of diarrhea.

Within a week to ten days of starting magnesium, I felt close to being well. I looked so well, that my psychiatrist thought I looked better than he had ever seen me. As I improved, I lowered my dosage of magnesium to find the best dosage for me. I lowered it too much and symptoms rapidly came back. Eventually, I stabilized the dosage at four 200-mg elemental magnesium (as magnesium glycinate) tablets a day. My depression is completely, totally, absolutely gone. I am active and can function mentally, emotionally, and physically at my best again. My vision and bowels have also returned to normal.

-- George Eby

In 1970 I read about Dr. Abram Hoffer's work and at that time was approached by a friend who had just been stopped from suiciding in a gas oven by her husband. She had her head in there and the

gas on. She had also just begun a new drug for bipolar (manic depression it was named then). She used to be admitted to the local Mental Hospital regularly every year at springtime. "I began her on high-dose B3, magnesium, vitamin C and zinc. Today she is 90 and as bright as a button, with a very keen mind. In the subsequent 33 years she has been in a mental ward only once, and that was when she thought she was cured and didn't have to take her vitamin/mineral formula anymore. At that time we were also approached by a young man who had attempted suicide on same drug. The same result we obtained for him. And this was only a small Western cattle and sheep town of 16,000 people. Since then, the same results have been obtained in all who have come to me for depression, bipolar, or schizophrenia.

-- Michael Sichel, D.O., N.D.



## Chittaway Bay, New South Wales, Australia 1. More Testimonials

I am an older woman who has been diagnosed with a terminal heart condition, diabetes, high blood pressure, and neuropathy. Over a year ago, I had a major heart attack, which killed the entire back of my heart, leaving only a damaged front of my heart to carry the load.

My doctor told me I would die shortly and to get my papers in order. His response when I disagreed with his prognosis was to offer more drugs to help me deal with my “denial,” in essence taking away any hope I had to survive.

At that point, I decided to look for a cardiologist who would be open to alternative methods of healing, allow me to be involved, and would most importantly allow me to have hope. After months of unsuccessful appointments with closed-minded doctors, I decided to take my healing into my own hands and began my quest for a form of natural healing on my own.

I stopped taking all prescription drugs and began experimenting with various alternative methods, techniques, and products, in hope of finding a “miracle cure.” I felt no effect from some of things I tried, with others I felt a little improvement, but nothing made any real difference in my pain level or my incredible weakness. No matter what I did, I could not regain my strength or alleviate my continuous pain.

Then a friend of mine (bless his heart) sent me some Essence of Life magnesium oil. The first day I sprayed a little below my ears, on some glands that had been swollen for 20 years. Now I am serious, for 20 years, every single day, these glands had been swollen and sensitive to touch. When I got up the next morning, I decided to spray a little more on the glands, but when I began to rub the oil in, I noticed there was NO swelling. The swelling wasn't reduced after 20 years—it was suddenly gone!

That was the beginning of my love affair with magnesium oil.

After 2 weeks of spraying it on my body 3-5 times a day, I now have periods each day where I am pain free, and I am discovering more strength

each day! It is incredible! This is the first product I have found that has given me such immediate and powerful results.

I absolutely love this product and believe it has saved my life.

I do not type these words casually; I was a dying woman and could feel my life force ebbing away each day. I now feel my strength and life force building in me, and know that I will heal. I cannot thank the makers and distributors of Essence of Life magnesium oil enough.

I believe this magic oil knows no limits in healing, and I wish the blessing of magnesium oil on anyone who is sick or in need of healing.

When we first started talking about the magnesium I was dying. I knew it inside. I am no longer dying. I feel life in me. I am so happy.

J. Jones, Washington State

Interestingly, right when the magnesium oil came I was having a strong cramp in my neck and shoulder, which I sometimes get from the computer. When I get it, it usually comes on for a day, until it is excruciating, and nothing makes it go away except the passage of a couple days' time. Well, I thought, I'll see if this magnesium stuff works like they say, and I rubbed one small squirt into my left neck and shoulder. Within five minutes the pain was gone, and I did not get several days of excruciating pain, like I usually do. Since that time I've used it on a couple other muscle aches with success, a couple of skin scratches that weren't healing very fast, and they were healed in a couple of days. I've tried it on a nagging joint pain in my left shoulder, which it hasn't helped so far. I did use it last night on a sore throat I felt coming on, and it was gone before I went to bed. I think you may be onto something with this!

Skip J.

We have just started using the Mg products. The bath is especially relaxing. Elaine and I sleep the night through after an evening 20-minute soak in 2 oz Mg bath salts in hot bath.

Elaine gets up often in the night. I am also spraying Mg oil onto my toothbrush with toothpaste, as well as in mouthwash. I also use it in my niddy pod, a little tea-pot looking container filled with water and some sea salt, then pour it through one nostril and it exits the other. Elaine is using the gel on her feet to relieve the peripheral neuropathy pain and hopefully rebuild the nerve cells.

Ken Norton

I've just started using the magnesium oil on my 7-year-old ASD

son. He's always tested very low in magnesium and I don't believe oral supplementation is doing that much. I put a few tablespoons of the oil in his bath water, and I also spray it onto my hands and rub it into his skin (tops of his feet and elbows). The reason I chose his elbows was because he's had this rash (large, bumpy, flesh colored) for quite some time. The magnesium stung at first when I rubbed it on, but after just a few nights, the rash is gone from one elbow and fading from the other!

Rose Langford

The very first day that I put the magnesium chloride oil on top of my knees and on my calves then rubbed it well into the knee joints, some of the pain went down. Next the edema (swelling) around my knees began to go down. It's awful when you can't reach down to pick up a piece of paper you just dropped on the floor because your knees won't bend, and you can't tug your shoes on over the heel of your foot. Then a short period of standing would bring on uncomfortable aches in my legs. The magnesium chloride oil began to bring these abilities back to normal for me gradually but permanently. I use it every day now and my body rewards me by feeling better all the time.

Kathleen Keith

Eyes

The oblique muscle actually loops around the eye through a loop of tissue under the forehead. Its purpose is obviously not to orient the eye as in

training on an object, but to actually squeeze the eye like a belt around a water balloon. This gentle squeezing produces a tiny, less than a millimeter change in the length of the eye and actually lengthens it for near focusing. A nearsighted person has chronic partial spasms in this muscle so it never completely releases. Therefore the eye is always configured for near vision. Nearsighted people often have pain above the eye under the eyebrow due to this tension and stress.

Conversely, a farsighted person sometimes experiences pain in the temples where some of the oblique muscles underlie. Hypertonic oblique muscles reflexively inhibit the oblique muscle and the eye is always predisposed to distant vision, and eventually due to lack of innervations, the oblique muscle becomes more and more useless.

After reading about unwinding spasms with magnesium oil, I diluted a little in an eyedropper bottle until the salinity was neutral to my tears and comfortably dropped it into my eyes. The effect is subtle, but I experienced some of my best distant vision (my challenge is nearsightedness) a day after using the drops for two days.

Sam Patterson

### Parkinson's Disease

I have completed my first day of magnesium oil therapy on William who has had Parkinson's for over 20 years. I am hoping for a revival of functionality but not with high expectations because of the severity and duration of his symptoms.

His condition before starting the magnesium oil was: He couldn't talk at all. Could not articulate what-so-ever! He was barely functional and did nothing voluntarily. No exercise and no attempt to stop drooling. The drooling was getting so bad and so constant that I was beginning to isolate him to his bedroom in his big recliner because the carpets are new here and the enzymes of the saliva stain permanently. And it appeared to be getting worse by the week. That's how he was. He also had started getting violent with me. If I pushed him too hard he would fly into a rage and hit me with whatever he could lay his hands on.

I applied the magnesium oil twice yesterday and he woke this morning and washed his own face, cleaned his teeth and put on his robe by himself—without being told to do these things. This is unheard of and hasn't happened for two years. What is more, he is not drooling. The drooling has been massive and absolutely uncontrollable for about a year. His swallowing reflex is simply going. He has had his nutritional drink, his coffee, his brain formula, fresh veggies, and scrambled eggs and hasn't drooled once. So, my hope is high. This is the best I've seen for a very long time.

After only three days interestingly his speech has been much better overall. I am applying it faithfully three times a day all over him. I will just keep up the application and let time do the explaining. I am very encouraged by the improvement in speech. I honestly did not expect to see any results. His eyes are brighter, the concentration is longer and better and the speech is much improved. By no means has he become a "toastmaster" but at least he can string two or three words together now and does not freeze up completely.

Most recently he has been quite violent. For example he thrashed me over the head with a plastic ladle one day so quickly that he got in six or seven good thwacks before I could snatch it away from him. But since starting the magnesium oil, his demeanor has improved immensely. No more surly ugly looks, no more stubborn refusals to swallow or do something that I ask him to do. Great improvement and best of all he is now able to communicate so he can tell me what he wants and needs.

I am glad that I ordered a gallon of the magnesium oil. I figure that it may take a gallon to see any meaningful results. After 3+

weeks his speech is still much improved. It seems to be stable now. He couldn't give any lectures at Harvard, but he can make himself understood as to what he needs or wants. As I said prior

to the magnesium treatment he couldn't speak well enough to communicate anything.

Nancy English Vinal

## ADHD

I wanted to first thank you from the bottom of my heart and soul for the magnesium oil. I do see a change in my son Dane when we use it. The best change that I have seen is when Dane soaks in a tub before bedtime he sleeps about 75 percent better. That is a good thing because he has always had a problem with sleep. He is medicated to help him sleep but even then, he does not rest well, talking in his sleep, flipping and flopping all night long, but after a soak, that is reduced greatly.

I'm not saying that he is normal and completely calm, but any difference is good. He is a very high-energy child, way too much energy for one kid. He tells me that he loves his magnesium. He insists that he feels calmer inside. I think you are onto something with this transdermal magnesium chloride lotion.

Think about all of the kids out there with ADHD and their parents who are willing to try anything to help calm their child. The only thing is that it needs to be used every day consistently. It just doesn't work as well if you are not consistent. I guess his body can't hold on to the magnesium very long. In fact if he uses it before bedtime he is good all night and by morning he is not as calm. But then I have been spraying him when he gets home from school.

Beth

## Autism & Varicose Veins

I've decided to sign up as a distributor for the magnesium chloride products because I've used them extensively in my healing practice and have had outstanding results. Previously I used and recommended Epsom salts, as they were cheap and easy for my clients to access. However, I found that Epsom salts were drying on people's skin, especially at the high concentrations that I've found to be most useful for healing and detoxification. We also tried a number of sea salts, such as Dead Sea salts, but there's something subtly different about your magnesium that makes it work better.

I also use it extensively with my son. He had a lot of impulse control, focus, etc. issues, so we had him tested at the local university. Among other things, he was diagnosed with Asperger's syndrome, which is a high functioning form of autism. During the evaluation, he was tested for a number of potential organic causes for his symptoms. His urine provocation test came back very high in several heavy metals. Apparently this is common in kids with autism spectrum disorders, one theory being that they

are not as efficient at purging these toxins from their systems as "normal" kids. We've been successfully using biomedical approaches to treat him, including far infrared sauna sessions and supplements. One of the more helpful treatments has been consistent magnesium baths. DAN protocol suggests using Epsom salts (if I understand correctly it's because it is magnesium sulfate and these kids need the sulfates as well as the magnesium). But the frequent Epsom salt baths were very drying on the poor kid's skin. I switched over to your magnesium chloride for his baths, along with the Master's Miracle soap/neutralizer combo. My son loves those baths! He doesn't have to rinse after the baths, even though we're using quite strong concentrations of magnesium. And his skin is now soft and moist despite having several baths each week. The combination of the FIR saunas and the magnesium baths have been very helpful in detoxifying his system and have really calmed his behavior. His teachers, neighbors and other family members have all commented on how much better he can focus and track now. I recently started to periodically mix some Epsom salts into the baths as well, just to make sure he's getting the benefits of the sulphates as well. Yet we mainly rely on the magnesium chloride.

Also, my father passed away recently, and my mom (who's in her 80s) has moved in with me. She'd gotten some very unsightly and uncomfortable varicose veins. She's not felt well enough to be able to get in and out of the bathtub, but I've been able to give her foot soaks in the Master's Miracle soap/neutralizer/magnesium flakes almost every day. I've been spraying the magnesium oil on her feet and lower legs after the footbaths and rubbing it in as well. We were both pleasantly surprised to see her varicosities have shrunk considerably after a couple of weeks of this treatment.

L.H.

## Headaches, Sinuses, Glands

I will tell you all the ways I have been using the mag oil, and I seem to be adding to them all the time. I have been “curing” a couple of things and have lots of things to use it on. In fact it seems every week now, I am using it for more things.

I have been using the mag oil successfully on the pain and inflammation of arthritis in my knees. I have been rubbing lots of the mag oil on and around and under my knees, a couple of times a day. Also to get rid of both sinus headaches and also what I call “ME” headaches or headaches caused by myalgic encephalomyelitis.

I have been rubbing it under my eyebrows, on my temples, on my forehead and behind my ears and the edge of my skull around the sides and back for the sinus headaches and congestion (being careful not to get it into the eyes though) plus the top of my spine and into the back of my head for the ME headaches.

Also I broke out in boils a few weeks ago and have been rubbing it on them. The boils have been very painful the first few days as the tops come off and they seem to have what look like large pores all over them; but it does work.

Those baths are terrific! I am sleeping better, in spite of the boils, than I have in 10 years. By better, I mean I seem to sleep deeper and feel more rested, plus don't wake up as often at night and fall asleep easier.

My sinuses don't get nearly as congested at night now—they tried everything to stop my almost continuous sinus infections but nothing worked. I have been using a homeopathic mixture which does work; but I have to use it every night and after four months realized that it was costing me a lot of money and while I was sleeping better, it wasn't curing anything.

I rub it onto my gums—I have gingivitis. My gums don't bleed anymore. I get a lousy taste in my mouth sometimes, but spray it 3 or 4 times in my mouth and it goes away.



I also get swollen and painful glands in my neck—didn't know I had so many glands until I got sick. Anyway, within 24-36 hours they will all clear up after spraying the mag oil in the sides of my mouth and on my back molars, three times a day. I have gone for so long in the past with swollen glands that I have forgotten what my face really looks like. I also squirt it onto the back of my throat when I get a sore throat now too—it goes away. I was surprised—I tend to be skeptical. In my experience, things that work for one person don't necessarily work for others—but this magnesium chloride seems to be different.

Frequently the glands under my arms and behind my knees also get sore and swollen. I have been rubbing it on these glands and it has been causing the pain and swelling to go away. That keeps coming back but it comes back less and less and goes away quicker. I tried just rubbing the glands without the mag just to see if I could get the same results—but it didn't work.

When I first started using it on my face and neck it 'burned' or stung a lot so diluted it with filtered water by 50 percent; after a week or so, then started using the mag gel; now doesn't sting anymore even with the undiluted mag oil. And my skin is much better; it does take away the wrinkles to a point. It sort of makes the skin smoother and makes the pores smaller. I have never found anything that truly does make the pores smaller before—those cosmetic face clay masks work for a few hours but my pores now seem to be permanently smaller.

It also exfoliates the skin. I know there are products out there in the cosmetic world that with much help from the consumer are supposed to do this—just never found one that worked nearly as well or easily as the mag chloride oil. Can't remember when I last had such soft feet.

Shan Russell

### Diabetic Testimonial

I have been using magnesium oil now for about three months and find it keeps my elevated blood pressure much lower without all the pills the doctor wanted me to be taking. It acts as a natural calcium channel blocker

as research is showing. I am a diabetic and find this very encouraging to prevent complications.

I spray all over the body every day, and take a full bath three times a week with magnesium oil added. I can tell the baths are strong, and when I get upset, it helps to calm me even more than baths did without the oil...when daily stresses get to me, I run for a relaxing bath with magnesium oil now.

My husband has a blockage of an artery in his leg, and often had trouble with pain and soreness. He is on his feet all day long, and he can feel the muscles in his leg cramping. He used to come home from work limping. He sprays the oil on his leg, and sometimes we massage his leg with this oil... but even without the massage, he feels the difference within about five minutes of spraying the oil on. He says the oil itches at first, then the pain and cramping disappears. He has started to use the magnesium oil with a heat treatment too, and lately he is not coming home limping anymore!

Research is also showing that magnesium has effects like statin drugs in lowering cholesterol. My husband's cholesterol used to be very high, and now it has also dropped significantly... yes, he has improved his diet, but I can't help but wonder if magnesium oil is not also working its wonders for this! He refused the advice on using a prescription drug from his MD and tried magnesium instead with a lowering of bad cholesterol by almost 250 points and is now back to very near acceptable levels, a truly gratifying surprise and benefit of increasing magnesium levels. We are both thrilled beyond words.

Claudia French, RN, LPHA

## 1. Closing Statements & Medical Malpractice Botox or Magnesium for Migraines

This concluding chapter for the second edition of my Transdermal Magnesium Therapy book provides a glaring example of magnesium ignorance and the price people pay for this ignorance. Four years ago when I published the first edition of this book I was told by an FDA whistleblower that a copy of my book was sitting on someone's desk at the FDA. Their decision to approve the use of Botox for migraines last week

shows that they did not take the magnesium research and science presented seriously. The only conclusion I can come to about this is that they are paid-off

medical officials who do not want to upset their medical masters at the big pharmaceutical companies.

Federal health officials actually approved the wrinkle-smoothing injection Botox for migraine headaches in October 2010, giving the drug maker Allergan clearance to begin marketing its drug to patients with a serious history of the condition. The drug won approval earlier this year to treat spasms in the elbows, wrists, and fingers. But it's also widely used off-label to treat broader movement disorders such as cerebral palsy. Botox works by blocking the connections between nerves and muscle, temporarily paralyzing the muscle. The drug is a purified form of botulinum, one of the most toxic substances in the world .

Migraines can be a totally disabling ailment that can render the sufferer incapable of performing even the most basic daily tasks.

The Food and Drug Administration approved the drug for patients who experience 15 or more days of migraine headaches per month.

Allergan, which specializes in beauty and eye-care drugs, said roughly 3.2 million people in the U.S. have chronic migraines.

For the new use, doctors are directed to inject patients in the neck or head every 12 weeks to dull future headaches.

Botulinum toxin is made by the bacteria *Clostridium botulinum*.

The bacteria themselves (and their spores) are harmless, but the toxin is considered one of the most lethal known poisons, one 20 20 20

that has been a principle agent in biological warfare. 74 79 78 It binds to nerve endings where they join muscles, leading to weakness or paralysis. Recovery from botulism occurs when the nerves grow new endings, which can take months, according to the 20 20 20

FDA. 74 79 79

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It is interesting to go back to a 2008 NIH study 75 70 70 that states Botulinum toxin A is not effective in the prophylaxis of episodic migraine . The same study reported that magnesium, riboflavin, and coenzyme Q10 are good treatment options and that magnesium may be particularly useful during pregnancy.” Dr. Sarah DeRossett, American neurologist and headache specialist, was quoted in July 2003 in support of magnesium and riboflavin/

vitamin B2 for migraine sufferers. “Patients who have migraines have lower blood levels of magnesium than patients who don’t have 20 20

migraines.” 75 70<sup>1</sup> The results of a 2008 study showed that magnesium proved to be beneficial in the prophylaxis of migraines 20 20

and might work with both vascular and neurogenic mechanisms. 75 70<sup>2</sup>

The FDA approved the new use based on two company studies of more than 1,300 patients who received either a Botox injection or a placebo injection. Patients who received Botox reported slightly fewer “headache days” than patients given the placebo treatment.

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75 70 <sup>3</sup> Patients on Botox reported about two fewer headache days

than patients who did not receive the drug. It is hard to understand the medical reasoning for the FDA approval of Botox poison for migraine sufferers based on these slim results.

Understanding only comes when we look at the FDA as a chemical terrorist organization whose very existence is to promote and provide the most dangerous and poisonous substances possible for medical use. The FDA knows about magnesium and how it can be very effective, when used correctly, to treat migraines and a host of diseases. They know magnesium

deficiency is a great plague affecting most everyone today but they still prefer to promote a poison instead of addressing the cause and source of people's migraines.

Last year, in the spirit of giving a bone to their staffers, the FDA did order manufacturers of all botulinum products to strengthen warnings that the toxins may cause muscle weakness and life-threatening breathing or swallowing difficulties if the poison spreads beyond the injection site . But that did not stop the agency from approving Botox for migraines even though they knew it was hurting people.

Now we see reports of increasing numbers of teenagers going for 20 20 20 20 20 20

Botox treatments 75 70 74 and doctors 75 70 75 (dermatologists) promoting this. In 2009, the American Society for Aesthetic 20 20 20

Plastic Surgery (ASAPS) reported 12,110 Botox or Dysport 75 70 76

(another botulinum poison) procedures were performed on patients 18 and under , up from 8,194 in 2008. The American Society of Plastic Surgeons (ASPS) reported 11,889 cosmetic Botox or Dysport procedures were performed on patients age 13 to 19 , an increase of two percent from 2008.

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48-year-old Dr. Sharla Helton 75 70 77 alleged that Botox injections caused her constant pain, blurred vision, and difficulty breathing—all symptoms consistent with botulism. “Botox is lethal and the problem is you can’t really tell where you are injecting it,” says Ray Chester, Helton’s attorney who won \$15 million in damages for her. “If you hit a blood vessel or if the Botox spreads outside the muscle, it can travel body wide and lead to botulism. This is a toxin,” says Chester. “It has been studied as a biological weapon and is actually the most lethal substance on the planet.”

On April 2, 2008 it was revealed in the Journal of Neuroscience 20 20 20

(JN) 75 70 78 that an Italian study conducted by the National Research Council's Institute of Neuroscience of Pisa, Italy found that protein associated with botulinum toxin injected into the whisker muscles of rats had migrated to the area of the brain 20 20 20

stem within three days of injection. 75 70 79 Researchers also discovered that the toxin migrated to various other parts of the brain that controls long-term memory and spatial navigation, and from the superior colliculus—which is associated with eye-head coordination—back to the eye.

Magnesium for Migraines Some of the materials in this section are drawn from the body of this book so please forgive the duplications. It does though give readers a chance to see how I apply or rush basic research to the frontlines of medical news issues that come up.

Magnesium researcher Dr. Herbert Mansmann, founder of the Magnesium Research Lab maintained that, "It's very likely that magnesium deficiency is a widespread cause of migraines."

Studies show that many people don't even come close to getting the Daily Value of magnesium, which is 400 milligrams. "On a daily basis, 30-40 percent of American people take less than 75

percent of the Daily Value of magnesium," said Dr. Mansmann.

Dr. Linda Rapson, who specializes in treating chronic pain, believes that about 70 percent of her patients who complain of muscle pain, cramps, and fatigue are showing signs of magnesium deficiency. "Virtually all of them improve when I put them on magnesium," says Rapson, who runs a busy Toronto pain clinic. "It may sound too good to be true, but it's a fact." She's seen the mineral work in those with fibromyalgia, migraines, and constipation. "The scientific community should take a good hard 20

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look at this." 75<sup>1</sup>70

Many people needlessly suffer pain—including fibromyalgia, migraines, and muscle cramps—because they do not get enough magnesium,” says Dr. Mildred Seelig, a leading magnesium researcher at the University of North Carolina. The problem is exacerbated when they load up on calcium, thinking it will help, when in fact, an overabundance of calcium flushes magnesium out of cells, compromising the effectiveness of both minerals.

Prescription medications, such as antidepressants, tranquilizers, and pain medications only treat the symptoms. Magnesium treats the symptoms while it simultaneously addresses the cause.

In the 90s cardiovascular biologist Dr. Burton M. Altura of the State University of New York Health Science Center at Brooklyn witnessed a therapeutic benefit of magnesium in acute symptoms such as headache pain. Dr. Altura administered a solution containing one gram of magnesium sulfate intravenously to 40

patients who visited a headache clinic in the throes of moderate to severe pain. They treated migraine sufferers with cluster and chronic daily headaches. Within 15 minutes, 32 of the men and women—80 percent—experienced relief. Though the headaches may not have vanished completely, the pain lessened by at least 50

percent.

In 18 of these individuals, the pain relief lasted at least 24

hours. Blood tests before treatment confirmed that all but four in this latter group had ionized magnesium concentrations that were lower than the average in a related group of pain-free individuals. “ All nine patients with cluster headaches had their acute headache aborted by magnesium therapy .” Migraine sufferers

who responded to the treatment experienced a complete alleviation of their current symptoms, including sensitivity to lights and sound. Subsequent studies of additional migraine patients have confirmed a common pattern, Altura says. “Those patients where ionized magnesium in the brain or blood

is low will respond to intravenous magnesium very quickly and dramatically.”

My youngest son suffers with migraines. Typically nothing helps him except consistent adjustments from the chiropractor. The same night that I first tried this on my daughter for the constipation, my son had an awful migraine and was very sick from it. I took some of the magnesium oil and began rubbing his neck and the base of his skull with it. After a few minutes he said

“ooh that feels good” and fell asleep. When he woke up the headache was gone!!! Now, I’m convinced!!! I will never be without magnesium oil in my house! I am still stunned that this worked so quickly with my children.

Debbie Graves

For a long list of testimonies on how magnesium helped migraine 20

sufferers please visit the Magnesium Online Library site. 75<sup>11</sup>

Mauskop et al. reported a deficiency in ionized magnesium in 45

percent of attacks of menstrual migraine, while only 15 percent of non-menstrually-related attacks had a deficiency. They also demonstrated that attacks associated with low ionized magnesium could be aborted by intravenous magnesium infusions. Facchinetti et al. demonstrated that menstrual migraine could be prevented by administration of oral magnesium during the last 15 days of the menstrual cycle. There is no shortage of evidence that magnesium is effective in reducing migraine frequency and pain: A 1992 study in Italy found that women with menstrual migraine who took magnesium at 360 mg/day beginning on day 15 of their menstrual cycle had decreased days of migraine and decreased 20

total pain by the second month of the regimen. 75<sup>12</sup>

A 1996 study in Germany found that migraine sufferers taking 600



mg of magnesium daily for 12 weeks had 41.6 percent fewer attacks than they had suffered before the treatment. The beneficial 20

effects were seen by the ninth week of treatment. 75<sup>13</sup>

A 2003 study in the United States (California) found the migraine-suffering children (ages 3-17) given magnesium at 9 mg/

kg/day had a small but significant decrease in migraine frequency 20

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and severity relative to the group taking a placebo. 75<sup>14</sup>

Obviously the FDA is not interested in what causes migraines and what needs to be done to help people with their suffering and pain. Some of the clearly identified triggers or factors that cause the headaches include:

Allergies and allergic reactions

Bright lights, loud noises, and certain odors or perfumes Physical or emotional stress

Changes in sleep patterns or irregular sleep Smoking or exposure to smoke

Skipping meals or fasting

Alcohol

All of these relate to magnesium deficiencies, meaning Botox will be of little help (as the company's studies clearly show). Botox is a potent poison that only fools play around with and that does little more than give a slight break from the blinding headaches—

this at great cost of exposing patients to yet another poison with nasty side effects. The FDA will do just about anything to block access to anything that truly helps people, especially if it's something natural from which the pharmaceutical companies cannot profit.

Just to give you some interesting background about Allergan, the company that makes Botox—on October 5, 2010 they were ordered by a judge to pay \$375 million to resolve Justice Department allegations that it promoted Botox for headache, pain, and juvenile cerebral palsy from 2000 to 2005 without U.S. approval.

The plea was approved by U.S. District Judge Orinda Evans in Atlanta. It includes a \$350 million criminal fine and \$25 million in forfeited assets, the Justice Department said. The company also agreed to a five-year compliance plan requiring it to disclose payments to doctors on its website and provide annual certification by senior executives and board members that divisions meet federal health-care requirements.

All Botox product labels now warn that the effects of the botulinum toxin may spread from the area of injection to other areas of the body, causing symptoms similar to those of botulism.

Those symptoms, which have mostly been seen in children with cerebral palsy who received injections off-label for treatment of muscle spasticity, include potentially life-threatening

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swallowing and breathing difficulties and even death. 75<sup>175</sup>

Between November 1, 1997 and December 31, 2006, the advocacy group Public Citizen reported that 658 people had adverse reactions to botulinum toxin. Of these, 180 people had difficulty swallowing or contracted aspiration pneumonia when food refluxed into the windpipe. Eighty-seven of those people had to be hospitalized and 16 died. All but one of the deaths were associated with therapeutic use.

These are the kinds of companies the FDA lords over. In this case, they have allowed proven criminals to pay the fine and begin to do the same criminal thing all over again with FDA approval. The FDA has magically declared this criminal

organization to be legal and even trustworthy in dealing with people's lives. I consider the FDA to be a modern-day medical Gestapo complete with storm troopers sporting the nastiest of attitudes.

## Conclusion

One can only conclude that pharmaceutical terrorism is alive and well and that the FDA and other medical organizations both inside and outside the government promote it. This chapter calls the entire framework of contemporary medicine into question because it is crystal clear that when doctors and the FDA ignore people's magnesium deficiencies and their desperate need for supplementation, they are, in fact, in a state of malpractice.

It is medical malpractice to not put magnesium at the heart of every treatment because it is the lamp of life and because the vast majority of chronically ill people are magnesium deficient.

The research and the clinical experience of many fine doctors could not be any clearer on this point. When doctors and medical officials ignore magnesium they are ignoring the basis of life—a basic cornerstone of natural allopathic medicine—that can improve and even save many people's lives. When surgeons didn't wash their hands, they killed people—and it's the same with magnesium.

Pharmaceutical medicine is a mistake of modern man that hopefully will not stand the test of time because it is doing far more harm than good. Magnesium on the other hand will stand for eternity as the best medicine that nature has given us. Modern medicine must embrace medical science, which fully sustains this view, or it will get what it deserves—risking extinction like the dinosaurs—

falling into some black hole never to be seen again.

## APPENDIX: Recommended Product Sources

Since the first edition of Transdermal Magnesium Therapy was published back in 2007, my patients and readers have come to know quite well that

quality and purity is of primary importance to me. The line of professional magnesium chloride products produced by Ancient Minerals have far exceeded my expectations, from stringent quality control to routine lab analysis, and are the only magnesium products I recommend to doctors and patients seeking the purest available for medical usage.

The following is a list of international distributors for Ancient Minerals:

United States

LL Magnetic Clay Inc.

PO Box 619

San Ramon, CA 94582

Phone: (925) 968 1571

Toll Free: (800) 257-3315

Email: [info@magneticclay.com](mailto:info@magneticclay.com)

Web: [www.magneticclay.com](http://www.magneticclay.com)

Australia

Rejuve Health Products Pty Ltd.

21 Kerenjon Ave.

Buderim, Queensland

Phone: 07 5476 5454

Email: [info@rejuvehealth.com](mailto:info@rejuvehealth.com)

Web: [www.rejuvehealth.com](http://www.rejuvehealth.com)

Canada

Promedics Neutraceuticals Ltd.

PO Box 155

2498 W 41st Avenue

Vancouver, BC V6M2A7

Toll Free: (877) 268-5057

Phone: (604) 261-5057

Email: [info@promedics.ca](mailto:info@promedics.ca)

Web: [www.promedics.ca](http://www.promedics.ca)

Ireland

Maiden Enterprises

Cloone

Castletownroche

Mallow, Cork

Phone: +085 11703570

Email: [info@magnesium.ie](mailto:info@magnesium.ie)

Web: <http://www.magnesium.ie> New Zealand

Top Health Group Ltd.

171 Thames St

Oamaru

Toll Free: 0800 000 980

Phone: +64 3 4348741

Email: [admin@pharmacy-nz.com](mailto:admin@pharmacy-nz.com)

Web: [www.pharmacy-nz.com/magnesium-oil.html](http://www.pharmacy-nz.com/magnesium-oil.html) Philippines

Magnesium Therapy Philippines

5233 LRV Bldg., Fahrenheit St.

Makati City, Philippines 1235

Phone: 632-5518855

Email: [info@magnesiumphilippines.com](mailto:info@magnesiumphilippines.com)

Web: [www.magnesiumphilippines.com](http://www.magnesiumphilippines.com)

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Omega 3 Global

159 Goldhill Centre

51 Thomson Road

307612

Phone: +65 93835995

Email: [michael@omega3global.com](mailto:michael@omega3global.com)

Web: [www.omega3global.com](http://www.omega3global.com)

South Africa

Vibrant Health Solutions

P.O. Box 2250

White River, Mpumalanga

Phone: +27 82 4103483

Email: [info@vibranthealthsolutions.co.za](mailto:info@vibranthealthsolutions.co.za) Web:  
[www.vibranthealthsolutions.co.za](http://www.vibranthealthsolutions.co.za)

United Kingdom

Good Health Naturally Inc.

Les Autelets, Sark

Guernsey, GY9 0SF

Phone: 207 043 9059

Toll Free: 0800 015 15 80

Email: [sales@goodhealthnaturally.com](mailto:sales@goodhealthnaturally.com)

Web: [www.goodhealthnaturally.com](http://www.goodhealthnaturally.com)

Endnotes

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[guid=percent7BCB1B41D1-5D56-414F-8A29-B0273495D494](http://www.marketwatch.com/news/story/national-study-shows-magnesium-sulfate/story.aspx?guid=percent7BCB1B41D1-5D56-414F-8A29-B0273495D494percent7D&dist=hppr)

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Air pollution is a serious environmental problem. We investigated whether residency in cities with high air pollution is associated with neuroinflammation/neurodegeneration in healthy children and young adults who died suddenly. We measured mRNA cyclooxygenase-2, interleukin-1beta, and CD14 in target brain regions from low (n = 12) or highly exposed residents (n = 35) aged 25.1 +/- 1.5 years. Upregulation of cyclooxygenase-2, interleukin-1beta, and CD14 in olfactory bulb, frontal cortex, substantianigrae and vagus nerves; disruption of the blood-brain barrier; endothelial activation, oxidative stress, and inflammatory cell trafficking were seen in highly exposed subjects. Amyloid beta42 (Abeta42) immunoreactivity was observed in 58.8 percent of apolipoprotein E (APOE) 3/3 < 25 y, and 100

percent of the APOE 4 subjects, whereas alpha-synuclein was seen in 23.5 percent of < 25 y subjects. Particulate material (PM) was seen in olfactory bulb neurons, and PM < 100 nm were observed in intraluminal erythrocytes from lung, frontal, and trigeminal ganglia capillaries. Exposure to air pollution causes neuroinflammation, an altered brain innate immune response, and accumulation of Abeta42 and alpha-synuclein starting in childhood. Exposure to air pollution should be considered a risk factor for Alzheimer's and Parkinson's diseases, and carriers of the APOE 4 allele could have a higher risk of developing Alzheimer's disease if they reside in a polluted environment.



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- Vomiting

- Stomach Pain
- Constipation
- Anorexia
- Excessive thirst
- Dry mouth or throat
- Frequent Urination
- Fatigue
- Lethargy
- Moodiness
- Irritability
- Confusion
- Extreme muscle weakness
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- Coma

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increased competition for reabsorption with magnesium; Hypercalcemia inhibits magnesium reabsorption, probably through competition for passive transport through the renal system.

Hypomagnesemia; Mahendra Agraharkar, MD, FACP Updated: June 20, 2002 <http://www.emedicine.com/med/topic3382.htm> 101 Distilled water is not safe for long term use, it lacks bicarbonates and minerals and yes, it is acid forming to the body. Yet it is an excellent aid in detoxification and chelation for it purity pulls on toxicities in the body. Part of the reason why our body is acid is that it lacks enough bicarbonate necessary to neutralize the acid. Whenever the water lacks the proper bicarbonates to neutralize the water in distilled water your body basically becomes acid. Long term acidity causes acid blood, which is like acid rain, causes the calcium from the bones to be leached out and as a result, the tissues and organ have too much of calcium clogging the system. Therefore distilled water is generally not recommended as a regular drinking water, since most of our body usually receives bicarbonates from the water we drink than from the food we eat. But we can easily treat distilled water by adding bicarbonate and magnesium and then it is not really distilled water anymore.

102 <http://www.uniquewater.com.au>

103 [http://www.amazon.com/Dietary-Reference-Phosphorus-Magnesium-Fluoride/dp/0309063507/ref=sr\\_1\\_1?](http://www.amazon.com/Dietary-Reference-Phosphorus-Magnesium-Fluoride/dp/0309063507/ref=sr_1_1?ie=UTF8&qid=1227893156&sr=11-1)

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Stanley M. Parsons. Department of Chemistry and the Marine Science Institute, University of California, Santa Barbara, Santa Barbara, California, U.S.A.

108 The method consists of using one tablespoon of magnesium carbonate to be dissolved with soda water. Buy a bottle of Carbonated Seltzer water - NO SODIUM, just carbonated “fizz”

water, unflavored. Refrigerate for a couple of hours. Get another, larger bottle, and pour 2/3 of a capful of PLAIN (no-flavor) Philips Milk of Magnesia (which is Magnesium Oxide, an alkaline laxative) into the large bottle. (The bottle comes with a plastic measuring cup which is what I mean when I say 2/3

capful.) Now quickly open the bottle of carbonated water (water +

carbonic acid) and empty it into the large bottle containing the 2/3 capful of Magnesia. Shake well. You will have a bottle of

milky/cloudy liquid which is in the process of neutralization between the carbonic acid and the magnesium oxide-- leaving a neutral salt, Magnesium Bicarbonate.

109 Ancient Minerals Magnesium Oil and Bath Flakes are both pure enough for oral consumption even they are not sold for oral use. See <http://www.ancient-minerals>

110 Perry, 1986; Perry and Laurent, 1990; Henry and Heming, 1998 <http://www3.interscience.wiley.com/journal/119558225/>

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Michael A. Porter and Bernard Grodzinski Plant Physiology, Vol. 72, No. 3  
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(article consists of 2 pages) Published by: American Society of Plant  
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115 Magnesium Research 2004, vol. 17, no2, pp. 90-93.

116  $Mg^{2+}$  is critical for all of the energetics of the cells because it is absolutely required that  $Mg^{2+}$  be bound (chelated) by ATP (adenosine triphosphate), the central high energy compound of the body. ATP without  $Mg^{2+}$  bound cannot create the energy normally used by specific enzymes of the body to make protein, DNA, RNA, transport sodium or potassium or calcium in and out of cells, nor to phosphorylate proteins in response to hormone signals, etc. In fact, ATP without enough  $Mg^{2+}$  is non-functional and leads to cell death. Bound  $Mg^{2+}$  holds the triphosphate in the correct stereochemical position so that it can interact with ATP

using enzymes and the  $Mg^{2+}$  also polarizes the phosphate backbone so that the 'backside of the phosphorous' is more positive and susceptible to attack by nucleophilic agents such as hydroxide ion or other negatively charged compounds. Bottom line,  $Mg^{2+}$  at critical concentrations is essential to life," says Dr. Boyd Haley who asserts strongly that, "All detoxification mechanisms have as the bases of the energy required to remove a toxicant the need for Mg-ATP to drive the process. There is nothing done in the body that does not use energy and without  $Mg^{2+}$  this energy can neither be made nor used." Detoxification of carcinogenic chemical poisons is essential for people want to avoid the ravages of cancer. The importance of magnesium in cancer prevention should not be underestimated.

117 Magnesium has a central regulatory role in the cell cycle including that of affecting transphorylation and DNA synthesis, has been proposed as the controller of cell growth,

rather than calcium. It is postulated that  $Mg^{++}$  controls the timing of spindle and chromosome cycles by changes in intracellular concentration during the cell cycle. Magnesium levels fall as cells enlarge until they reach a level that allows for spindle formation. Mg influx then causes spindle breakdown and cell division.

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119 <http://cndyorks.gn.apc.org/news/articles/du/drrb.htm> 120 A radioisotope of an element will bind best to the same substrates which a non-radioactive isotope of the same element will bind. Dr. Stearns has established that when cells are exposed to uranium, the uranium binds to DNA and the cells acquire mutations, triggering a whole slew of protein replication errors, some of which can lead to various cancers. Stearns'

research, published in the journals Mutagenesis and Molecular Carcinogenesis, confirms what many have suspected for some time -

that uranium can damage DNA as a heavy metal, independent of its radioactive properties. The biochemical reaction of heavy metals can cause genetic mutations, which in turn can curtail cell growth and cause cancer. Heavy metals that are also radioactive amplify this effect and can cause distortions in shape and thus function even of red blood cells.

121 A study of the acidosis, blood urea, and plasma chlorides in uranium nephritis in the dog, and the protective action of sodium bicarbonate. The Journal of Experimental Medicine, Vol 25, 693-719, Copyright, 1917, by The Rockefeller Institute for Medical Research New York  
[http://www.jem.org/cgi/](http://www.jem.org/cgi/content/abstract/25/5/693)

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Eades, Michael R., MD, Are Antioxidants Harmful?,  
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124 proteoglycans are a combination of long chains of special, modified sugars (oligo-saccharides) known as glycosaminoglycans (GAGs) that are lashed together much like Oriental bamboo scaffolding by special, modified proteins.

125 “High dietary intake of magnesium may decrease risk of colorectal cancer in Japanese men” Volume 140, Pages 779-785

Authors: E. Ma, S. Sasazuki, M. Inoue, M. Iwasaki, N. Sawada, R.

Takachi, S. Tsugane, Japan Public Health Center-based Prospective Study Group.

126 Journal of Internal Medicine 2007, vol. 262, no2, pp.

208-214 [7 page(s) (article)] (34 ref.)

127  $Mg^{2+}$  is critical for all of the energetics of the cells because it is absolutely required that  $Mg^{2+}$  be bound (chelated) by ATP (adenosine triphosphate), the central high energy compound of the body. ATP without  $Mg^{2+}$  bound cannot create the energy normally used by specific enzymes of the body to make protein, DNA, RNA, transport sodium or potassium or calcium in and out of cells, nor to phosphorylate proteins in response to hormone signals, etc. In fact, ATP without enough  $Mg^{2+}$  is non-functional and leads to cell death. Bound  $Mg^{2+}$  holds the triphosphate in the correct stereochemical position so that it can interact with ATP using enzymes and the  $Mg^{2+}$  also polarizes the phosphate backbone so that the ‘backside of the phosphorous’ is more positive and susceptible to attack by nucleophilic agents such as hydroxide ion or other negatively charged compounds. Bottom line,  $Mg^{2+}$  at critical concentrations is essential to life,” says Dr.

Boyd Haley who asserts strongly that, “All detoxification mechanisms have as the bases of the energy required to remove a toxicant the need for  $Mg$ -



ATP to drive the process. There is nothing done in the body that does not use energy and without  $Mg^{2+}$  this energy can neither be made nor used.” Detoxification of carcinogenic chemical poisons is essential for people want to avoid the ravages of cancer. The importance of magnesium in cancer prevention should not be underestimated.

128 Magnesium has a central regulatory role in the cell cycle including that of affecting transphorylation and DNA synthesis, has been proposed as the controller of cell growth, rather than calcium. It is postulated that  $Mg^{++}$  controls the timing of spindle and chromosome cycles by changes in intracellular concentration during the cell cycle. Magnesium levels fall as cells enlarge until they reach a level that allows for spindle formation. Mg influx then causes spindle breakdown and cell division.

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polarizes the phosphate backbone so that the ‘backside of the phosphorous’



is more positive and susceptible to attack by nucleophilic agents such as hydroxide

ion or other negatively charged compounds. Bottom line,  $Mg^{2+}$  at critical concentrations is essential to life. All detoxification mechanisms have as the bases of the energy required to remove a toxicant the need for Mg-ATP to drive the process. There is nothing done in the body that does not use energy and without  $Mg^{2+}$  this energy can neither be made nor used,” says Dr. Haley.

195 The aim of the study was to evaluate the changes in blood Mg, epinephrine and norepinephrine concentrations in patients undergoing extracorporeal circulation and normovolemic hemodilution. The study encompassed 16 men operated on for stable coronary disease (I or II degrees according to the Canadian Scale). The patients were divided into two groups according to body weight: A) patients weighing less than 75 kg and B) patients weighing more than 75 kg. The degree of NH caused by constant volume of priming (1800 mL) was determined on the basis of hematocrit measurements and in relation to body weight.

The examinations were conducted in 5 stages: 1) after radial artery cannulation before anaesthesia and surgery, 2) during hemodilution and deepest hypothermia, 3) after surgery before sending the patient to Intensive Postoperative care Unit, 4) in the first postoperative day, 5) in the second postoperative day.

The observations showed an increase in epinephrine levels in group A in the second stage and of norepinephrine levels in stage 4. Decreased blood Mg levels were noted in all the patients in the second stage, however in group A significantly lower values were also observed in stage 3. Moreover, the correlation between Mg level changes and blood epinephrine and norepinephrine levels were observed. The study revealed significant effects of extracorporeal circulation procedures on adrenergic reactions as well as blood magnesium concentrations. It seems that the degree of NH is the main factor determining blood levels of Mg, epinephrine and norepinephrine during the use of a heart-lung apparatus, which may be particularly relevant in patients with impaired heart function and low body weight. The relationship between magnesium, epinephrine and

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208 Lists numerous reliable sources of statistical information on hypertension: [http://www.wrongdiagnosis.com/h/](http://www.wrongdiagnosis.com/h/hypertension/prevalence.htm)

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209 Magnesium fights range of serious ills; Dr. W. Gifford-Jones, Special to The Star Phoenix Saturday, April 29, 2006

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210 Swapping plain old table salt for a blend of sodium chloride, potassium chloride, and magnesium sulfate can reduce

systolic blood pressure by more than most dietary changes and as much as some antihypertensive drugs. Low cost and “This is actually a large effect, larger than is typically seen for dietary interventions in trials,” Dr. Neal said. SALT SUBSTITUTE

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213 Why isn’t magnesium routinely used in heart disease?

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After publication of the ISIS 4 trial results, many criticisms came forth identifying major flaws in the trials design in addition to the hazardous dosages of magnesium given. Damien Downing BBBS, published a scathing editorial in the BMJ which states “there are several clear methodological flaws in the ISIS-4 protocol which call into question both its finding on magnesium, and the more general conclusion that has been drawn concerning mega-trials. The implications of these shortcomings are

evidently serious for AMI sufferers, but also therefore for the progress of medical science at large. They also inescapably raise the question of whether ISIS-4 is an instance of misreporting that amounts to research misconduct.”

“For 40 years now, researchers have been claiming that parenteral magnesium administration may have a beneficial effect on mortality and morbidity in acute myocardial infarction (AMI) [1, 2]. For about the same time, an association has been apparent between magnesium deficiency and prevalence of ischaemic heart disease [3, 4]. By 1992 several small controlled trials had shown a positive result for magnesium therapy in AMI [5-12], and a meta-analysis concluded that it reduced short-term mortality more than any other agent [15]. The same year, the LIMIT-2 study confirmed this with a 24 percent reduction in mortality in the first 28 days [17] (and 21 percent in the longer term [18]).

Then, in 1995, the very large-scale ISIS-4 study appeared, reporting no benefit from magnesium, and indeed a slight detriment [20]. Very quickly, this study was used to support the argument that magnesium offered no benefit in AMI [21] and, further, that meta-analysis is intrinsically flawed, and only mega-trials will lead us to the truth [22].”

The principal methodological criticisms are that the administration of magnesium in this ISIS 4 trial was: too much, too late, too quick, too uncontrolled.

No rationale was ever given for the high doses of magnesium used in the trial, high doses previously known to cause toxic adverse effects.

Magnesium protects against many of the complications that can occur in acute MI, but it is well established that, to be effective, administration should begin as soon as possible after the onset of symptoms. This becomes particularly important when thrombolysis is performed, because successful thrombolysis re-establishes blood-flow to damaged myocardium, and the consequent reperfusion injury can itself be harmful. Magnesium protects against this, but only if it is given early enough. “Study treatment was generally to be started immediately after the early lytic phase (i.e. the first hour or so) of any fibrinolytic regimen”, it further seems clear that in

respect of magnesium administration the protocol was violated in over 50 percent of ISIS- 4 subjects.

By limiting the amount of time magnesium would be administered to a 24 hour maximum, no chance was given to show that magnesium would reduce mortality. In previous studies, giving magnesium for 36-72 hours showed decreased mortality, with shorter administration times resulting in higher mortality rates.

In conclusion Mr. Downing explains that, “Every major study these days involves a press release announcing the results. These are the scientific equivalent of the work of ‘spin doctors’ in government. A further cause for concern regarding ISIS-4 is the way in which the results were released, in November 1993, in the form of a press release embargoed until the first day of the American Heart Association meeting in Atlanta, at which the preliminary results were presented to the meeting. At this time, according to the final paper (which appeared somewhat later, in March 1995), it was only 9 weeks since randomization had ended, and only 81 percent of follow-up data was available for analysis.

Already though, the tone of the press release makes it clear how the authors wished their report to be viewed: Dr Rory Collins, the ISIS- 4 coordinator, said “These results will disappoint those who had trusted the positive claims from previous small trials of magnesium and nitrates.”

“In an editorial in 1991 we discussed the issue of ‘Tabloid Science’: ‘the public, bombarded with health stories alongside politics, sport and the rest of the news, have no opportunity to acquire an overview of the research evidence; each story is displaced from memory by the next, or the one after that, and perception of the truth is ephemeral, immediate and partial, and often trivialized’. In this context, the combination of the ISIS-4 report and the way it was presented to the world looks like a deliberate and so far very successful strategy. Those who

had trusted the previous studies were indeed disappointed, though not necessarily in the way meant by Dr Collins, and the impact on clinical care has been substantial. If they are not deliberate, then the multiple anomalies in the design and execution of ISIS-4, whose effects all accumulate towards

an underestimate of the usefulness of magnesium, must indicate startling ignorance and/or negligence on the part of the ISIS- 4 authors. Either this was bungling or it was research misconduct.”

For a detailed analysis see “Is ISIS 4 research misconduct?”

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[uids=16955723&itool=iconabstr&itool=pubmed](#) 239 Bernard Rimland.

While no patient has been cured with the vitamin B6 and magnesium treatment, there have been many instances where remarkable improvement has been achieved. In one such case an 18-year-old autistic patient was about to be evicted from the third mental hospital in his city. Even massive amounts of drugs had no effect on him, and he was considered too violent and assaultative to be kept in the hospital. The psychiatrist tried the B6/magnesium approach as a last resort. The young man calmed down very quickly. The psychiatrist reported at a meeting that she had recently visited the family and had found the young man to now be a pleasant and easy-going young autistic person who sang and played his guitar for her.

<http://www.autism> 240 C. M. Banki, M. Arato and C. D. Kilts. Aminergic studies and cerebrospinal fluid cations in suicide. Annals of the New York Academy of Sciences , Vol 487, Issue 1 221-230, Copyright ©

1986 by New York Academy of Sciences

241 This is the first experimental study in which magnesium intakes were tightly controlled and EEG measurements were analyzed by computer so they could be statistically compared.

242 <http://www.ars.usda.gov/is/np/fnr/fnr1095.htm#calm> 243  
Magnesium Research (1990) 3, 3, 217-218 Letter to the Editor.

244 Andrasi E, Igaz S, Molnar Z, Mako S. Disturbances of magnesium concentrations in various brain areas in Alzheimer's disease. L. Eotvos University, Budapest, Hungary. Magnes Res .

2000 Sep;13 (3):189-96.

245 Dementias: the role of magnesium deficiency and an hypothesis concerning the pathogenesis of Alzheimer's disease.

Med. Hypotheses 31, 211-225.

246 <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

[db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list\\_uids=1705](#)

[5945&itool=iconabstr&itool=pubmed](#) DocSum 247 Magnesium concentration in brains from multiple sclerosis patients ACTA NEUROL. SCAND. (Denmark), 1990, 81/3

(197-200)

248 Mag Res . 1992;5:281-93

249 <http://www.flev.com/ms.html>

250 Multiple sclerosis: Decreased relapse rate through dietary supplementation with calcium, magnesium and vitamin D; MED. HYPOTHESES (UK), 1986, 21/2 (193-200) 251 P. Rossier , S. van Erven and D. T. Wade Rivermead Rehabilitation Centre, Abingdon Road, Oxford England (DOI) 10.1046/j.1468-1331.2000.00142.x.

252 Biol Trace Elem Res . 1988 Jan-Apr;15:179-203. Selenium in chronic neurologic diseases. Multiple sclerosis and Batten's disease. Clausen J, Jensen GE, Nielsen SA. Institute for Life Sciences and Chemistry, University of Roskilde, Denmark.

253 Magnesium ions constitute the physiologically active magnesium in the body; they are not attached to other substances and are free to join in biochemical body processes.<sup>5</sup> This is one basic reason magnesium helps to detoxify toxic chemicals and helps eliminate heavy metals from the body. Another reason would be the part it plays in glutathione production but undoubtedly, as Dr. Haley indicates, the Mg-ATP provides the crucial energy to remove each toxicant. A magnesium ion is an atom that is missing two electrons, which makes it search to attach to something that will replace its missing electrons so it is actively and directly involved in diminishing heavy metal toxicity. Magnesium appears to be a competitive inhibitor of lead and cadmium. An increased level of magnesium has been shown to eliminate lead and cadmium through the urine and has also been reported to reduce the toxic effects of aluminum.

254 <http://www.healthfinder.gov/newsletters/heart042406.asp> 255 In Greek, hormone means “to set in motion.” Hormones are made by endocrine glands to control another part of the body.

They require protein and fatty acids, cholesterol and magnesium to manufacture them. Many different hormones must be balanced one with another. This is done in at least two ways: (1) by the brain’s information center, which monitors the state of the body, and (2) self-regulation as each gland detects chemical levels in the blood, giving “feedback” on the needs of the body. Glands may react by secreting one hormone to shut down the production or effects of another. Glands have the power to produce several different kinds of hormones at any time. The liver also has the power to control an overabundance of some hormones in the blood.

Endocrine glands include the gonads, pineal, pituitary, thyroid, parathyroid, thymus and adrenals.

256 Colditz GA, Hankinson SE, Hunter DJ, Willett WC, Manson JE, Stampfer MJ, et al. The use of estrogens and progestins and the risk of breast cancer in postmenopausal women. *N Engl J Med* 1995;332:1589-93.

257 Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and hormone replacement therapy. *Lancet* 1997;350:1047-59.

258 Garg PP, Kerlikowske K, Subak L, Grady D. Hormone replacement therapy and the risk of epithelial ovarian carcinoma: a meta-analysis. *Obstet Gynecol* 1998;92:472-9.

259 <http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a682922.html>

260 Hill DA, Weiss NS, LaCroix AZ. Adherence to postmenopausal hormone therapy during the year after the initial prescription. *Am J Obstet Gynecol* 2000;182:270-6.

261 A deficiency in magnesium causes hyperplasia of the adrenal cortex, elevated aldosterone levels, and increased extracellular fluid volume.

Aldosterone increases the urinary excretion of magnesium; hence, a positive feedback mechanism results, which is aggravated since there is no renal mechanism for conserving magnesium.

262 <http://www.earlymenopause.com/9909.htm> 263 Perimenopause is the naturally occurring transition period that takes place in women before the onset of menopause.

It may begin as early as 35, even earlier for women who smoke. It is a temporary phase, typically lasting two to three years for most women, though for some it can last as long as 10 or 12

years. Women in perimenopause rank insomnia, irritability, and depressed mood among the most common complaints. Mental health is the most prevalent difficulty, not hot flashes. This stage of a women's life has not been talked about much, and a woman can find herself experiencing puzzling changes, and not know why. Studies have shown that in the perimenopause the incidence of negative changes was somewhat higher than in the postmenopause, the latter bringing relief of discomfort and a more positive mental outlook.

Perimenopause terminates with the cessation of menstruation.

264 <http://www.newtreatments.org/depression> 265 Dahl, 1950; Nida and Broja, 1957; Goldsmith, 1963; Goldsmith et al., 1970; Goldsmith, 1971). The use of estrogen-containing oral contraceptives has been shown to reduce the serum levels of magnesium (in users versus nonusers) by 16 percent (Goldsmith et al., 1966), 28 percent (DeJorge et al., 1967), and by 27 percent and 33 percent (Goldsmith, 1971). Evaluation of different contraceptives suggests that it is the estrogen moiety that is responsible for the decrease in serum magnesium (Goldsmith and Goldsmith, 1966; Goldsmith et al., 1970, Goldsmith and Johnston, 1976/1980) although there are conflicting findings.

So all the contraceptive pills, and hormone replacement estrogen preparations are probably decreasing women's magnesium levels too. Seelig, Mildred; <http://www.mgwater.com/Seelig/Magnesium-Deficiency-in-the-Pathogenesis-of-Disease/>

chapter5.shtml#toc5-1-4-3

266 <http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/>

[S/SexHormones.html](#)

267 <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

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268 [http://www.ncbi.nlm.nih.gov/entrez / query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?)

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269 Richard N. Ash MD; Alternative Medicine and Health ;

<http://alternative-medicine-and-health.com/conditions/>

[menopause.htm](#)

270 Northrup, C. MD. Women's Bodies, Women's Wisdom . Judy Piatkus  
Publ. London, England, 1995.

271 Werbach, M. MD, J Alt & Comp Med . Feb. 1994;12(2).

272 Take Control of Your Hot Flashes: <http://>

[www.cbsnews.com/stories/2005/09/15/earlyshow/series/](http://www.cbsnews.com/stories/2005/09/15/earlyshow/series/)

[main848036.shtml](#)

273 Reports differ but there has been some consensus that up to 80 percent of women in western societies such as Australia suffer from a myriad of physical and psychological difficulties at menopause (MacLennan, 1988). These include hot flushes, night sweats, vaginal dryness, loss of libido, palpitations, headaches, osteoporosis, depression and irritability (Walsh & Schiff, 1990).

Interestingly, women in some non-western cultures appear to be significantly less affected by menopausal ills. For instance, Mayan women

from South America (Beyene, 1986) and Rajput women in India (Kaufert, 1982) report no 'symptoms'. According to Lock et al (1988) Japanese women rarely mention hot flushes and the incidence of other problems such as backache and headache is low.

It is therefore expected that due to the cross-cultural nature of the sample certain differences are likely to emerge with regard to physical, psychological and socio-cultural menopause experiences.

Women, body and society. Cross-cultural differences in menopause experiences; Gabriella Berger & Eberhard Wenzel ; [http://](http://www.ldb.org/menopaus.htm)

[www.ldb.org/menopaus.htm](http://www.ldb.org/menopaus.htm)

274 Obermeyer CM. Menopause across cultures: a review of the evidence. Menopause 2000;7:184-92.

275 Risk for new onset of depression during the menopausal transition: the Harvard study of moods and cycles. Cohen:Arch Gen Psychiatry. 2006 Apr;63(4):385-90.

276 Cerebrospinal fluid magnesium and calcium related to amine metabolites, diagnosis, and suicide attempts; Banki et al;Biol Psychiatry. 1985 Feb;20(2):163-71.

277 Treatment of severe mania with intravenous magnesium sulphate as a supplementary therapy. Heiden A et al; Psychiatry Res. 1999 Dec. 27; 89(3): 239-46

278 Institute of Medicine.Food and Nutrition Board. Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride. National Academy Press. Washington, DC, 1999

279 Aging and magnesium; Saito N, Nishivama S; Clin Calcium. 2005 Nov;15(11):29-36.

280 Magnesium supplementation and osteoporosis.Seijka Je, Weaver ; Nutr Rev. 1995 Mar;53(3):71-4

281 How significant is magnesium in thermoregulation? J

Basic ClinPhysiolPharmacol . 1998;9(1):73-85. PMID: 9793804

[PubMed - indexed for MEDLINE]

282 Therapeutic hypothermia shows promise as a treatment for acute stroke. Surface cooling techniques are being developed but, although noninvasive, they typically achieve slower cooling rates than endovascular methods. We assessed the hypothesis that the addition of intravenous MgSO<sub>4</sub> to an antishivering pharmacological regimen increases the cooling rate when using a surface cooling technique. Subjects who received MgSO<sub>4</sub> had significantly higher mean comfort scores than those who did not (48 $\pm$ 15 versus 38 $\pm$ 12; P<0.001). CONCLUSIONS: Administration of intravenous MgSO<sub>4</sub> increases the cooling rate and comfort when using a surface cooling technique. Magnesium sulfate increases the rate of hypothermia via surface cooling and improves comfort. Stroke. 2004 Oct;35(10):2331-4. Epub 2004 Aug 19. PMID: 15322301 [PubMed - indexed for MEDLINE] <http://>

[www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?)

cmd=Retrieve&db=pubmed&dopt=Abstract&list  
uids=15322301&itool=iconfft&query 283 [http://72.14.203.104/search?  
q=cache: 2Lsm-2ZiMbQJ:www.profmagnesium.com/PDF percent27S/Mg  
percent2520in percent2520Thermoregulation  
percent25201997.pdf+magnesium+and+thermoregulation&hl=en&gl=us&c  
t=clnk&cd=5](http://72.14.203.104/search?q=cache:2Lsm-2ZiMbQJ:www.profmagnesium.com/PDF+percent27S/Mg+percent2520in+percent2520Thermoregulation+percent25201997.pdf+magnesium+and+thermoregulation&hl=en&gl=us&ct=clnk&cd=5)

284 Department of Internal Medicine, Overlook Hospital, Summit, NJ, USA. Hypomagnesemia has long been known to be associated with diabetes mellitus. Mather et al confirmed the presence of hypomagnesemia in nearly 25 percent of their diabetic outpatients. Low serum magnesium level has been reported in children with insulin-dependent diabetes and through the entire spectrum of adult type I and type II diabetics regardless of the type of therapy. Hypomagnesemia has been correlated with both poor diabetic control and insulin resistance in nondiabetic elderly patients.



Hypomagnesaemia and diabetes mellitus. A review of clinical implications.  
Tosiello L; Arch Intern Med. 1996 Jun 10;156(11):1143-8.

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

cmd=Retrieve&db=PubMed&list\_uids=8639008&dopt=Abstract 285 v57,  
Better Nutrition for Today's Living, March '95,  
p34.<http://www.mgwater.com/articles.shtml> 286 Barbagallo, Mario et al.  
Effects of Vitamin E and Glutathione on Glucose Metabolism: Role of  
Magnesium; (

Hypertension . 1999;34:1002-1006.) American Heart Association  
<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

cmd=Retrieve&db=pubmed&dopt=Abstract&list\_uids=10523398&query  
hl=22

287 Hua H. et al: Magnesium transport induced ex vivo by a  
pharmacological dose of insulin is impaired in non-insulin-dependent  
diabetes mellitus. Magnes Res. 1995, Dec; Magnes Res.

1995 Dec;8(4):359-66. PMID: 8861135 [PubMed - indexed for MEDLINE]  
<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

CMD=Display&DB=pubmed

288 A tendency for magnesium deficiency in patients with diabetes mellitus  
is well-established. Glucosuria-related hypermagnesiuria, nutritional factors  
and hyperinsulinaemia-related hypermagnesiuria all can contribute. The  
plasma magnesium level has been shown to be inversely related to insulin  
sensitivity. Magnesium supplementation improves insulin sensitivity as well  
as insulin secretion in patients with type 2

diabetes. Nevertheless, no beneficial effects of oral magnesium  
supplementation has been demonstrated on glycaemic control either in  
patients with diabetes type 1 or 2. Oral magnesium supplementation  
reduced the development of type 2 diabetes in predisposed rats. There are  
some indications that magnesium decreases blood pressure, but negative

results have been observed in trials that were, however, not designed to test effect on blood pressure as primary parameter. Patients with (severe) retinopathy have a lower plasma magnesium level compared to patients without retinopathy and a prospective study has shown the plasma magnesium level to be inversely related to occurrence or progression of retinopathy. Further study on magnesium (supplementation) is warranted in the prevention of type 2 and of (progression of) retinopathy as well as a means to reduce high blood pressure. Magnesium in Diabetes Mellitus; de Valk HW. Neth J Med . 1999 Apr;54(4):139-46.

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

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289 Lower serum magnesium levels are associated with more rapid decline of renal function in patients with diabetes mellitus type 2. Clin Nephrol . 2005 Jun;63(6):429-36. PMID: 15960144.

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

`cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15960144&itool=iconabstr&query`

290 Diabetic ketoacidosis (DKA) is a dangerous condition that can cause you to lose consciousness. If untreated, it can be fatal. This is a diabetic crisis state, and can quickly lead to fatality, including cerebral edema, most often seen in children.

It is also common in DKA to have severe dehydration and significant alterations of the body's blood chemistry.

Diabetic ketoacidosis is a triad of hyperglycemia, ketonemia and acidemia. (ketones and acid in the bloodstream) Major components of the pathogenesis of diabetic ketoacidosis are reductions in effective concentrations of circulating insulin and concomitant elevations of counterregulatory hormones (catecholamines, glucagon, growth hormone and cortisol). These hormonal alterations bring about three major metabolic

events: (1) hyperglycemia resulting from accelerated gluconeogenesis and decreased glucose utilization, (2) increased proteolysis and decreased protein synthesis and (3) increased lipolysis and ketone production.

291 Diabetic ketoacidosis: Check your ketones; From MayoClinic.com  
Special to CNN.com <http://www.cnn.com/HEALTH/>

[library/DA/00064.html](http://www.mayoclinic.com/library/DA/00064.html)

292 This article exemplifies the AAFP 1999 Annual Clinical Focus on management and prevention of the complications of diabetes. Diabetic ketoacidosis is an emergency medical condition that can be life-threatening if not treated properly. The incidence of this condition may be increasing, and a 1 to 2

percent mortality rate has stubbornly persisted since the 1970s.

Diabetic ketoacidosis occurs most often in patients with type 1

diabetes (formerly called insulin-dependent diabetes mellitus); however, its occurrence in patients with type 2 diabetes (formerly called noninsulin-dependent diabetes mellitus), particularly obese black patients, is not as rare as was once thought. The management of patients with diabetic ketoacidosis includes obtaining a thorough but rapid history and performing a physical examination in an attempt to identify possible precipitating factors. The major treatment of this condition is initial rehydration (using isotonic saline) with subsequent potassium replacement and low-dose insulin therapy. The use of bicarbonate is not recommended in most patients. Cerebral edema, one of the most dire complications of diabetic ketoacidosis, occurs more commonly in children and adolescents than in adults.

Continuous follow-up of patients using treatment algorithms and flow sheets can help to minimize adverse outcomes. Preventive measures include patient education and instructions for the patient to contact the physician early during an illness. ( Am Fam Physician 1999;60:455-64.)ABBAS E. KITABCHI, PH.D., M.D., and BARRY M. WALL, M.D. University of

Tennessee, Memphis, College of Medicine Memphis, Tennessee  
<http://www.aafp.org/afp/990800ap/>

455.html

293 Chronic Renal Failure (Chronic Renal Insufficiency, Kidney Failure, Renal Insufficiency) (CRF) Irreversible, progressive impaired kidney function. The early stage, when the

kidneys no longer function properly but do not yet require dialysis, is known as Chronic Renal Insufficiency (CRI). CRI can be difficult to diagnose, as symptoms are not usually apparent until kidney disease has progressed significantly. Common symptoms include a frequent need to urinate and swelling, as well as possible anemia, fatigue, weakness, headaches and loss of appetite. As the disease progresses, other symptoms such as nausea, vomiting, bad breath and itchy skin may develop as toxic metabolites, normally filtered out of the blood by the kidneys, build up to harmful levels. Over time (up to 10 or 20 years), CRF

generally progresses from CRI to End-Stage Renal Disease (ESRD, also known as Kidney Failure). Patients with ESRD no longer have kidney function adequate to sustain life and require dialysis or kidney transplantation. Without proper treatment, ESRD is fatal.

294 Sloan Kettering Health Care Information for Professionals:  
[http://www.mskcc.org/mskcc/html/11571.cfm?](http://www.mskcc.org/mskcc/html/11571.cfm?RecordID=481&tab=HC)

[RecordID=481&tab=HC](http://www.mskcc.org/mskcc/html/11571.cfm?RecordID=481&tab=HC)

295 The effect of magnesium supplementation in increasing doses on the control of type 2 diabetes. Diabetes 1998 May;21(5): 682-6.  
[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&listuids=9589224&itool=iconfft&query hl=34&itool=pubmed)

[cmd=Retrieve&db=pubmed&dopt=Abstract&listuids=9589224&itool=iconfft&query hl=34&itool=pubmed](http://magnesiumresearchlab.com/Diabetes) 296  
<http://magnesiumresearchlab.com/Diabetes> 297 Hasanein P. et al. Oral magnesium administration prevents thermal hyperalgesia induced by diabetes in rats.

Department of Biology, Bu-Ali Sina University, Hamadan, Iran.

Diabetes Res Clin Pract . 2006 Jan 14

298 See <http://www.MagnesiumForLife.com> for full information on transdermal magnesium chloride mineral therapy.

And go to <http://www.globallight.net> to see the recommended natural seawater product with the highest concentration and lowest toxicity that the International Medical Veritas Association endorses.

299 Long term magnesium supplementation influences favourably the natural evolution of neuropathy in Mg-depleted type 1 diabetic patients (T1dm); De Leeuw et al; Magnes Res. 2004

Jun; 17(2):109-14 <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>

`cmd=Retrieve&db=pubmed&dopt=Abstract&list`

`uids=15319143&itool=iconabstr&query` 300 If a drug can exert its effects in minute dosage the small amount absorbed through the skin may be sufficient for systemic effect. A number of drugs can be administered to adults through the skin - namely, nitroglycerine for angina, hyoscine for travel sickness, clonidine for hypertension, and oestrogens for replacement therapy (only nitroglycerin is available in the United Kingdom). The drug delivery system is in the form of an adhesive patch, containing (from the outside to the skin surface) an occlusive backing, a reservoir of the drug, a microporous

membrane, and an adhesive. The microporous membrane is less permeable to the drug than the skin and is therefore rate limiting, releasing the drug in a controlled way. Such a method of drug administration is not simply a curious gimmick. It is convenient, requiring less frequent dosage than oral administration, produces more predictable and constant blood concentrations, can be taken by vomiting patients, and can be removed at once. Unfortunately, most drugs given chronically to children (anticonvulsants, antibiotics, and bronchodilators) require too high a dose to be effective through the percutaneous route. Drug absorption through the

skin: a mixed blessing; Archives of Disease in Childhood , 1987, 62, 220-221.

301 <http://naturalallopathic.com/cms/>

302 The dose is the quantity of medicine to be administered at one time and the regimen is a strictly regulated program. The concentration of the applied dose, the surface area of the body, and the elapsed time the chemical is on the skin are the main considerations affecting absorption. As the concentration of a drug is increased, the total amount absorbed into the skin and body also increases. Increasing the surface area of the applied dose also increases penetration. Penetration occurs over time.

The longer the substance is on the skin, the greater the chance for continued penetration. Chances for toxicity may occur when high concentrations of a drug are spread over a large area of skin.

303 Marks R M, Barton S P, Edwards C (1988). The Physical Nature of the Skin. Lancaster: MTP Press.

304 “For epitheliomas, basalomas and melanomas, the treatment to choose is iodine solution at seven percent, as it is capable of precipitating the proteins of the body of the fungus and destroying them completely in a short time. If the lesions are fairly small, they must be painted with the solution 10-20-30

times twice a day for five days and then once for another ten days so that they become very dark. When the eschar is formed and it is higher than the epidermic plane, it is necessary to continue to paint under and above it, even if at first a strong pain is sensed.”

305 The best cost effective magnesium bath flakes that I have found are Ancient Minerals. Six and a half pounds costs 55

dollars.

306 German research have shown Dead Sea salts have ultimately been the reason for reduced amounts of LangerhansA cells in the epidermis, and

conversely salts of sodium chloride were void of any effect at all. (al G. S., 1990 December).

Magnesium chloride is also discussed when the topic of dermatitis comes into play as an excellent treatment protocol. The anti-inflammatory result of utilizing hypertonic Dead Sea solution on atopic dermatitis by means of magnesium ions is well known. (al.,

2002) Further studies also revealed that the magnesium solution greatly reduced inflammation in allergic contact dermatitis. The study involved five patients with an identified nickel allergy, where magnesium chloride (not sodium chloride) stifled nickel-sulfate induced contact dermatitis. ( Greiner J , 1990 November) 307 Diffusion is the mechanism by which components of a mixture are transported around the mixture by means of random molecular (Brownian) motion (cf. permeation: the ability of a diffusant to pass through a body - dependent on both the diffusion coefficient,  $D$ , and the solubility coefficient,  $S$ , ie, permeability coefficient,  $P = D.S$ ). Flynn et al. cite Berthalot as postulating, at the beginning of the nineteenth century, that the flow of mass by diffusion (ie, the flux), across a plane, was proportional to the concentration gradient of the diffusant across that plane. <http://www.initium.demon.co.uk/fick.htm> 308 Dr. Raul Vergin offered the following guidelines for oral intake of a 2.5 percent Magnesium Chloride-hexahydrate ( $MgCl_2 \cdot 6H_2O$ ) solution (i.e.: 25 grams or approximately one ounce of pure food grade powder in a liter of water). The quantity of elemental magnesium contained in a 125 cc dose of the 2.5 percent solution is around 500 mg.

Dosages are as follows:

Adults and children over 5 years old 125 cc 4 year old children 100 cc

3 year old children 80 cc

1-2 year old children 60 cc

Over 6 months old children 30 cc

Under 6 months old children 15 cc

125 milliliter = 4.2267528 ounce [US, liquid]

cc and ml are equivalent

Dr. Vergin indicates that “In acute diseases the dose is administered every 6 hours (every 3 hours the first two doses if the case is serious); then space every 8 hours and then 12 hours as improvement goes on. After recovery it’s better going on with a dose every 12 hours for some days. As a preventive measure, and as a magnesium supplement, one or two doses a day can be taken indefinitely. Magnesium Chloride, even if it’s an inorganic salt, is very well absorbed and it’s a very good supplemental magnesium source.”

309 Magnesium chloride is an ionic compound because it has a metal, magnesium, and a nonmetal, chlorine. Magnesium will lose two electrons and form a +2 charge. Chlorine will gain one

electron to form a chloride ion with a -1 charge. The formula for the compound is  $MgCl_2$ . To get the formula weight, find the atomic weights and add them together taking the subscripts into account.

Magnesium is 24.3; chlorine is 35.5; so two would be 71.0. The total gives 95.3 as the formula weight.

310 Magnesium Oil from the sea weighs 12 pounds per gallon.

Distilled water weighs only 8 pounds. Thus we can calculate in a straight away manner how much elemental magnesium is in each gallon.

311 Crippa G, Sverzellati E, Giorgi-Pierfranceschi M, et al. Magnesium and cardiovascular drugs: interactions and therapeutic role. *Ann Ital Med Int.* 1999 Jan; 14(1):40-5.

312 Eisenberg MJ, Magnesium deficiency and sudden death (editorial), *AM Heart J* 1992 Aug; 124(2):544-9

313 *Journal of Nutritional Medicine* 1994, 169-177



314 The Effect of Magnesium Sulphate on Hemodynamics and Its Efficacy in Attenuating the Response to Endotracheal Intubation in Patients with Coronary Artery Disease G. D.Puri, MD, PhD , *K. S. Marudhachalam, MD, DA, DNB*, Pramila Chari, MD, FAMS, MAMS, DA?, and R. K. Suri, MS, FAMst Departments of

\*Anaesthesia and Intensive Care and tcardiothoracic and Vascular Surgery, Postgraduate Institute of Medical Education & Research, Chandigarh, India <http://www.anesthesia-analgesia.org/cgi/>

reprint/87/4/808.pdf

315 Smetana, R. Wink, K. Magnesium, acute myocardial infarction and reperfusion injury. Medicine and Konrad Wink, University Clinic Internal Medicine IV (Vienna, Austria). Clin Calcium . 2005 Feb;15(2):261-4

316 [http://www.cja-jca.org/cgi/content/full/50/7/732?](http://www.cja-jca.org/cgi/content/full/50/7/732?view=long&pmid=12944451#R93#R93)

[view=long&pmid=12944451#R93#R93](http://www.cja-jca.org/cgi/content/full/50/7/732?view=long&pmid=12944451#R93#R93)

317 The Case for Intravenous Magnesium Treatment of Arterial Disease in General Practice: Review of 34 Years of Experience S. E. BROWNE MB BCH.

318 [http://209.85.141.104/search?q=cache:8q205pwjZDMJ:www.bernco.gov/upload/images/fire\\_rescue/](http://209.85.141.104/search?q=cache:8q205pwjZDMJ:www.bernco.gov/upload/images/fire_rescue/0405Protocol_Changes.pdf+emt+protocol+for+magnesium+use&hl=en&ct=clnk&cd=1&gl=us)

[0405](http://209.85.141.104/search?q=cache:8q205pwjZDMJ:www.bernco.gov/upload/images/fire_rescue/0405Protocol_Changes.pdf+emt+protocol+for+magnesium+use&hl=en&ct=clnk&cd=1&gl=us)

[Protocol\\_Changes.pdf+emt+protocol+for+magnesium+use&hl=en&ct=clnk&cd=1&gl=us](http://209.85.141.104/search?q=cache:8q205pwjZDMJ:www.bernco.gov/upload/images/fire_rescue/0405Protocol_Changes.pdf+emt+protocol+for+magnesium+use&hl=en&ct=clnk&cd=1&gl=us) 319 Attygalle D, Rodrigo N. Magnesium as first line therapy in the management of tetanus: a prospective study of 40 patients.

Anaesthesia 2002; 57: 778–817.[Medline]

320 Magnesium in the intensive care unit; from 21st International Symposium on Intensive Care and Emergency Medicine Brussels, Belgium. 20–23 March 2001; Critical Care 2001, 5(Suppl 1):P207 <http://ccforum.com/content/5/S1/P207>

321 <http://www.mgwater.com/browne01.shtml> m 322 Browne SE. Intravenous magnesium sulphate in arterial disease. *The Practitioner* 1969; 202: 562-4.

323 Singh SP. Use of vasodilator drug in shock (letter). *Br Med J* 1966; 2: 765.

324 Most therapeutic drugs (diuretics, chemotherapeutics, immunosuppressive agents, antibiotics) cause hypomagnesemia due to increased urinary loss. It is concluded that most of the clinical situations studied show hypomagnesemia due to renal loss, with exception of renal disease.

325 Unwanted babies in the past were often deposited in institutions where modern antiseptic procedures and adequate food seemed to guarantee them at least a fighting chance for a healthy life. But the babies died, not from infectious diseases or malnutrition, but by wasting away from a condition called

“marasmus.” Sterile surroundings did not cure it; having enough food made no difference. These unwanted babies died from a completely different kind of deprivation: lack of touch. When the babies were removed from these large, impersonal institutions and placed in environments where they received physical nurturing along with formula, the marasmus reversed. They gained weight and finally began to thrive. Touch is vital for survival in the very young.

326 Possible Role of Magnesium in Disorders of the Aged; Mildred S. Seelig, M.D. Volume 3a, *Modern Aging Research Intervention In the Aging Process, Part A: Quantitation, Epidemiology, and Clinical Research*; pages 279-305 available at: <http://www.mgwater.com/aging>

327 Magnesium deficiency in critical illness. *J Intensive Care Med*. 2005 Jan-Feb;20(1):3-17. Entrez Pubmed 328 Kligman AM: A biological brief on percutaneous absorption. *Drug Dev Industr Pharm* 9:521-560, 1983.

329 Byl NN: The use of ultrasound as an enhancer for transcutaneous drug delivery: Phonophoresis. *Phys Therap* June; 75

(6):539-553, 1995.

330 <http://www.ancient-minerals.com/magnesiumchloride.html#magnesium-absorption>

331 <http://www.mgwater.com/transdermal.shtml> 332 The concentration of magnesium in the pure magnesium oil is about 80,000 mg/l and when you apply that directly on the skin, intake rate is high. But in the case of a bath application my new recommendation is to use somewhere between 1500 and 5000

mg/l magnesium (1 to 4 times the sea concentration). Dead Sea

therapy has a concentration of up to 40,000 mg/l magnesium and people bathe every day in these waters. Fick's Law of Membrane Permeability says that the amount of any solute (magnesium) that will be absorbed is directly dependent upon the area of contact, the concentration of the solution and the time that the solute is in contact with the membrane.

<http://magnesiumforlife.com/>

[transdermal-magnesium/combining-oral-with-transdermal/](http://magnesiumforlife.com/transdermal-magnesium/combining-oral-with-transdermal/)

333 Side effects wear off quickly but can include racing pulse, tremors, nausea and insomnia. Nebulizer asthma treatments can also raise blood pressure and aggravate glaucoma.

334 <http://kidshealth.org/parent/medical/asthma> 335 Inhaled magnesium sulfate in the treatment of acute asthma. Blitz M, Blitz S, Beasley R, Diner BM, Hughes R, Knopp JA, Rowe BH.

336 Blitz M, et al. Inhaled magnesium sulfate in the treatment of acute asthma. Cochrane Database Syst Rev 2005 Jul 20;(3) CD003898.

337 Mahajan P, Haritos D, Rosenberg N et al. Comparison of nebulized magnesium sulfate plus albuterol to nebulized albuterol plus saline in children with acute exacerbations of mild to moderate asthma. J Emerg Med . 2004; 27:215.

338 Mangat HS, D. Souza GA, Jacob MS. Nebulized magnesium sulphate versus nebulized salbutamol in acute bronchial asthma, a clinical trial. EurRespir J. 1998; 12:3414.

339 Nannini LJ, Pendino JC, Corna RA et al. Magnesium sulfate as a vehicle for nebulized salbutamol in acute asthma. Am J Med . 2000; 108:193–7.

340 Nannini LJ, Hofer D. Effect of inhaled magnesium sulfate on sodium metabisulfite-induced bronchoconstriction in asthma. Chest.1997; 111: 858–61.

341 <http://www.emedmag.com/html/pre/tox/0804.asp> 342  
<http://ecam.oxfordjournals.org/cgi/content/abstract/>

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343 [http://www.prohealth.com/library/showarticle.cfm?](http://www.prohealth.com/library/showarticle.cfm?libid=10906)

libid=10906

344 Altern Med Rev 2000;5(5):429-431.

345 Reasons for inhaled GSH's effectiveness include its role as a potent antioxidant, and possibly improved oxygenation and host defenses. Theoretical uses of this treatment include Farmer's lung, pre- and postexercise, multiple chemical sensitivity disorder and cigarette smoking. GSH inhalation should not be used as a treatment for primary lung cancer. Testing for

sulfites in the urine is recommended prior to GSH inhalation.

Minor side effects such as transient coughing and an unpleasant odor are common with this treatment. Major side effects such as bronchoconstriction have only occurred among asthma patients presumed to be sulfite-sensitive. The potential applications of inhaled GSH are numerous when one considers just how many pulmonary diseases and respiratory-related

conditions are affected by deficient antioxidant status or an over production of oxidants, poor oxygenation and/or impaired host defenses.

346 Medical Definition: Profound debility of children due to lack of food and to unhygienic surroundings. <http://>

[www.quinton-water.com/main/page\\_testimonials\\_athrepsia\\_results.html](http://www.quinton-water.com/main/page_testimonials_athrepsia_results.html) 347

Rene Quinton “was the first person to discern and to investigate the similarity between sea water and mammalian lymph and blood plasma systems. He endeavored to solve the mysteries of sea water and its compatibility with living organisms by proceeding to carry out several scientific experiments in hospitals. The results he obtained were dramatically unexpected, since several people who were dying regained their vigor. Rene Quinton worked in collaboration with Drs. Potocki, Mace and Haricot, and for four years he labored at perfecting his techniques and adjusting dosages. In 1904, he released the results of his hospital experiments in a book entitled, ‘L’eau de mer, milieu organique’ (Sea Water: Organic Medium). The book was re-issued in 1995 because of the timeliness of its well-researched contents.”

348 In one experiment, René Quinton and his medical team drained a dog of all of its blood and replaced it with isotonic (diluted) seawater. The dog should have died immediately, one would think, but the dog lived. On day two after the transfusion, 50 percent of the blood components had reappeared. By day four, almost 100 percent of the missing blood components were restored in what appeared to be proof of biological transmutation (a change from one element to another). Not only did the blood completely regenerate, but soon after the procedure the dog bounced around like a puppy with greater vitality than before, and it lived for many years afterwards.

349 <http://www.usatoday.com/money/industries/food/>

[2004-04-18-hawaii-seawater\\_x.htm](http://2004-04-18-hawaii-seawater_x.htm)

350 Circulation 2006;113;1675-1682; originally published online Mar 27, 2006; Van Horn, David R. Jacobs, Jr. and Peter J.

Savage. Ka He, Kiang Liu, Martha L. Daviglus, Steven J. Morris, Catherine M. Loria, Linda <http://circ.ahajournals.org/cgi/>

reprint/113/13/1675?

hits=10&FIRSTINDEX=0&FULLTEXT=magnesium&SEARCHID=1&gc  
a=circulationaha percent3B113 percent2F13 percent2F1675& 351  
<http://www.fritzspecty.com/chemicals/>

magnesiumchloride.htm

352 <http://www.sciencelab.com/page/S/PVAR/10420/SLM4306>

353 <http://www.sigmaaldrich.com/catalog/search/>

ProductDetail/SIGMA/M1028

354 <http://www.consumerlab.com/results/magnesium.asp> 355  
<http://ff.org/centers/csspp/library/co2weekly/>

20051222 *news/20051222* 15.html

356 <http://www.xmission.com/~fogsl/research> 357 LL's Magnetic Clay, Inc.

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<http://www.ancient-minerals>

358 <http://www.usatoday.com/money/industries/food/>

2004-04-18-hawaii-seawater\_x.htm

359 A colorless, deliquescent, odorless material crystals or flakes. Very soluble in water and freely soluble in alcohol.

Solubility at 20° C. is 54.6 g/100cc. How Made: Occurs naturally as the mineral bischofite. It is manufactured as a by-product of the potash industry, from natural brines, from seawater, and in the presence of an organic reducing agent. Recovery from brines and from potash manufacture is achieved by concentrating the liquor by solar evaporation and then fractional crystallization of other salts. The resulting mixture of magnesium chloride and magnesium sulfate (epsom salts) is traditionally called 'nigari.'

Magnesium chloride can also be synthesized by reacting magnesium oxide, magnesium carbonate, magnesium ammonium chloride hexahydrate, or magnesium hydroxide with a solution of hydrochloric acid (Bryce-Smith, 1960 from Budavari, 1996), or as a by-product of potassium mining and fertilizer production (Tisdale et al., 1985).

360 Magnesium Research . Volume 18, Number 3, 187-92, September 2005, original article

361 <http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?>

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363 Rauws, A.G., Pharmacokinetics of Bromide Ion-An Overview. Fd. Chem. Toxic., 21:379-382, 1983

364 Iodine, the Rest of the Story; David Brownstein M.D.; <http://vrp.com/articles.aspx?ProdID=art1860&zTYPE=2>

365 In a very tightly controlled 3-month US study the effects of magnesium depletion on exercise performance in 10

women were observed—and the results make fascinating reading. In the first month, the women received a magnesium-deficient diet (112mgs per day), which was supplemented with 200mgs per day of magnesium to bring

the total magnesium content up to the RDA of 310mgs per day. In the second month, the supplement was withdrawn to make the diet magnesium-deficient, but in the third month it was reintroduced to replenish magnesium levels. At the end of each month, the women were asked to cycle at increasing intensities until they reached 80% of their maximum heart rate, at which time a large number of measurements were taken, including blood tests, ECG and respiratory gas analysis. The researchers found that, for a given workload, peak oxygen uptake, total and cumulative net oxygen utilization and heart rate all increased significantly during the period of magnesium restriction, with the amount of the increase directly related to the extent of magnesium depletion. In plain English, a magnesium deficiency reduced metabolic efficiency, increasing the oxygen consumption and heart rate required to perform work—exactly what an athlete doesn't want!

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371 Brilla, Lorrie. ACSM journal, Medicine and Science in Sports and Exercise , Vol. 31, No. 5, May 1999.

372 Med Exerc Nutr Health 4:230-233 (1995).

373 8 Pre and post leg strength measurements were made using a Biodex isokinetic dynamometer.” The strength of the ZMA group increased by 11.6% compared to only a 4.6% increase in the placebo group.



374 Intravenous Nutrient Therapy; Dr. Alan Gaby; [http://](http://www.orthomolecularnutrition.net/information.html)

[www.orthomolecularnutrition.net/information.html](http://www.orthomolecularnutrition.net/information.html)

375 Danforth WH. Control of Energy Metabolism, New York: Academic Press, 1965:287-298

376 According to Dr. Jeffrey Sankoff, “Because our bodies can only function within a narrow range of temperature, mechanisms exist for cooling. The most important of these mechanisms is the production of sweat. When sweat is formed on the skin, the heat from the body evaporates the water and energy is dissipated. However, if it is very hot sweating becomes less efficient as the air—rather than heat generated by the body—

evaporates the sweat. And in humid conditions water evaporation slows, so sweating becomes less effective.” See:

[www.insidetri.com/train/tips/articles/2218.0.html](http://www.insidetri.com/train/tips/articles/2218.0.html).

377 The Math Of Salt Loss; Jonathan Toker; Oct.26, 2009;  
[http://www.slowtwitch.com/Training/General Physiology/](http://www.slowtwitch.com/Training/General_Physiology/The_Math_of_salt_loss_1093.html)

*The Math of salt loss* 1093.html 378 C. Consolazio, et al., “Excretion of sodium, potassium, magnesium, and iron in human sweat and the relation of each to balance and requirements,” J. Nutr 79 (1963): 407-415.

379 12 R. McDonald and C. Keen, “Iron, zinc, and magnesium nutrition and athletic performance,” Sports Med . 5 (1988): 171-184.

380 13 P. Deuster, et al., “Magnesium homeostasis during high-intensity anaerobic exercise in men,” J. Appl. Physiol. 62

(1987): 545-550.

381 The average size amalgam filling contains approximately 750,000 micrograms of mercury (Hg) which releases part of that everyday for as long as the filling is in a person’s mouth. A microgram (mcg) is 1/1,000 of a milligram in weight or one-millionth of a gram. A milligram (mg) is 1/1,000 of a gram by weight. People with amalgam are exposed to from

tens to several hundreds of micrograms of mercury per day depending on how many fillings are in their mouth, how old the fillings are, how much a person brushes their teeth, chews and eats, the bacteria count in the mouth, and even the temperature of the body. Dr. Murry Vimy, professor of dentistry says, “It is estimated that the average individual, with eight biting surface mercury fillings, is exposed to a daily dose uptake of about 10 micrograms mercury from their fillings. According to Dr. Magnus Nylander, “Data suggest that approximately 19 to 20% of the general population may experience sub-clinical CNS and/or kidney function impairment as a result of the presence of amalgam fillings.” Dr. Robert Gammal states, “Mercury from amalgam fillings has been shown to be neurotoxic, embryotoxic, mutagenic, teratogenic, immunotoxic and clastogenic. It is capable of causing immune dysfunction and auto-immune diseases.” It is important to remember that mercury toxicity is a retention toxicity that builds up during years of exposure. The toxicity of a singular level of mercury is greatly

increased by current or subsequent, low exposures to lead or other toxic heavy metals.

382 Y. Rayssiguier<sup>1</sup>, C. Y. Guezennec, and J. Durlach. INRA, Laboratoire des Maladies Métaboliques, France: Urinary Mg losses during an endurance event could play a role in this depletion but are often reduced, reflecting renal compensation. Loss of Mg by sweating takes place only when there is a failure in sweat homeostasis, a situation which arises when exercise is made in conditions of damp atmosphere and high temperature. Stress caused by physical exercise is capable of inducing Mg deficit by various mechanisms. A possible explanation for decreased plasma Mg concentration during long endurance events is the effect of lipolysis. Since fatty acids are mobilized for muscle energy, lipolysis would cause a decrease in plasma Mg.

383 17 Y. Rayssiguier<sup>1</sup>, C. Y. Guezennec, and J. Durlach.

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384 Journal of Trace Elements in Medicine and Biology .

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387 Levaux C, Bonhomme V, Dewandre P.Y., Brichant J.F., Hans P, “Effect of intra-operative magnesium sulphate on pain relief and patient comfort after major lumbar orthopaedic surgery.” Anaesthesia , vol. 58, no. 2, pp. 131-135

388 Steinlechner<sup>1</sup> B, Dworschak<sup>1</sup> M, Birkenberg B, Grubhofer G, Weigl M, Schiferer A, Lang T, Rajek A, “Magnesium moderately decreases remifentanyl dosage required for pain management after cardiac surgery.” British Journal of Anaesthesia , vol. 96, no.

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390 Management of Obstetric Hypertensive Crises; OBG

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[www.obgmanagement.com/article\\_pages.asp?AID=3573&UID=](http://www.obgmanagement.com/article_pages.asp?AID=3573&UID=)

391 Folic acid vitamins E, B6 and B12, iron, magnesium, zinc and selenium deficiencies have been known to cause infertility that is easily reversible with supplementation (McLeod, 1996).

392 Howard JM, Davies S, Hunnisett A. 1994. Red cell magnesium and glutathione peroxidase in infertile women - effects of oral supplementation with magnesium and selenium. Magnesium Research 7(1):49x57

393 Women are another group of drug consumers who should be especially concerned with drug-induced nutrient depletion. Few women know that oral contraceptives lower the levels of such vital nutrients as vitamin B2, B6, and B12, vitamin C, folic acid magnesium and zinc. Mainstream hormone replacement (chiefly Premarin, but also Estratab and raloxifene) can also lead to deficiencies in vitamin B6, magnesium and zinc. Drugs That Deplete - Nutrients That Heal a review of the book Drug Induced Nutrient Depletion Handbook by Pelton et al.

[http://www.lef.org/magazine/mag2000/july2000\\_review.html](http://www.lef.org/magazine/mag2000/july2000_review.html) 394 Institute of Medicine advisory: Reducing preterm birth; Causes, Consequences and Prevention; National Academies Press, June 2006;  
<http://www.nap.edu/catalog/11622.html> 395 Rats kept severely magnesium depleted (receiving 1/200

the control magnesium intake) for the entire 21-day period of gestation had no living fetuses at term (Hurley and Cosens, 1970, 1971; Hurley, 1971; Hurley et al., 1976). The shorter the duration of the magnesium deficiency, the fewer implantation sites were affected. When the deficiency was maintained from day 6-12, about 30% of the implantation sites were involved and 14%

of the full-term fetuses had gross congenital abnormalities (cleft lip, hydrocephalus, micrognathia or agnathia, clubbed feet, adactyly, syndactyly, or polydactyly, diaphragmatic hernia, and heart, lung, and urogenital anomalies). Milder magnesium deficiency (1/130 control intake) maintained throughout pregnancy resulted in resorption of half the implantation sites and malformation of the living young at term.

396 Magnesium Deficiency in the Pathogenesis of Disease , Seelig, M; Part 1, chpt. 2. <http://www.mgwater.com/Seelig/>

Magnesium-Deficiency-in-the-Pathogenesis-of-Disease/  
chapter3.shtml

397 There is mounting evidence of magnesium insufficiency during pregnancy. Experimental acute magnesium deficiency has caused increased

parathyroid secretion and even parathyroid hyperplasia (Larvor et al., 1964a; Kukolj et al., 1965; Gitelman et al., 1965, 1968a,b; Lifshitz et al., 1967; Sherwood et al., 1970, 1972; Targovnik et al., 1971). Thus, the possibility that magnesium deficiency is contributory to hyperparathyroidism of pregnancy, which is common despite widespread supplementation with calcium and vitamin D.

398 Infants at greatest risk of neonatal hypomagnesemia are low-birth-weight infants, including those suffering from intrauterine growth retardation (IUGR) or premature infants

recovering from birth hypoxia or later respiratory distress, and infants born to very young primiparous women or to young mothers who have had frequent pregnancies or multiple births, to preeclamptic mothers, and to diabetic mothers. The incidence of neonatal magnesium insufficiency may be greater than suspected.

The tendency of women with preeclampsia or eclampsia to develop rising plasma magnesium levels during the last month of pregnancy, even without magnesium therapy, despite which they retain high percentages of parenterally administered pharmacologic doses of magnesium, suggests that magnesium deficiency might be far more common during pregnancy than is indicated by the incidence of hypomagnesemia. Magnesium Deficiency in the Pathogenesis of Disease, Seelig, M; Part 1, chpt. 2.

<http://www.mgwater.com/Seelig/Magnesium-Deficiency-in-the-Pathogenesis-of-Disease/chapter3.shtml> 399 Magnesium Sulfate in Obstetrics: current data J Gynecol Obstet Biol Reprod (Paris). 2004 Oct;33(6 Pt 1):510 7

400 Magnesium chloride or magnesium sulfate: A genuine question; Magnesium Research . Volume 18, Number 3, 187-92, September 2005

401 Sudden infant death syndrome (SIDS) is defined as the sudden death of an infant or young child, which is unexpected by history, and in which a thorough postmortem fails to demonstrate an adequate cause for death. SIDS accounts for 35% of post-natal deaths.

402 Two clinical forms of chronic gestational Mg deficiency in women have been stressed: Premature labor when chronic maternal Mg deficiency is involved in uterine hyperexcitability, Sudden Infant Death Syndrome (SIDS) when it is caused by either simple Mg deficiency or various forms of Mg depletion. If gestational Mg deficiency is the only cause for uterine overactivity, nutritional Mg supplementation constitutes the etiopathogenic atoxic tocolytic treatment. Mg deficiency or various forms of Mg depletion. SIDS may be caused by the fetal consequences of maternal Mg deficiency through an impaired control of Brown Adipose Tissue (BAT) thermoregulation, mechanisms leading to a modified temperature set point. SIDS may result from dysthermias: hypo- or hyperthermic forms. A possible prevention could rest on simple maternal nutritional Mg supplementation. SIDS might be linked to an impaired maturation of both the photoneuroendocrine system and BAT. A preventive treatment of this form of SIDS should associate atoxic nutritional Mg therapy for pregnant women with total light deprivation at night for the infant. New data on the importance of gestational Mg deficiency. Durlach; Magnes Res. 2004 Jun; 17(2):116-25 EntrezPubMed

403 Published findings in mothers of victims of sudden infant death syndrome (SIDS) and in the SIDS victims are compared with characteristics of magnesium deficiency in humans and

animals. Observations concerning the level of magnesium in traditional diets of selected ethnic groups with the highest or lowest rates of SIDS appear to confirm the importance of magnesium in protecting the offspring from sudden death. The apparent impact of gestational magnesium (Mg) deficiency on the sudden infant death syndrome (SIDS); Cardell; MagnesRes. 2001Dec; 14(4):291-303

404 [http://www.sciencenews.org/pages/sn\\_arch/12\\_14\\_96/](http://www.sciencenews.org/pages/sn_arch/12_14_96/)

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405 <http://www.marketwatch.com/news/story/national-study-shows-magnesium-sulfate/story.aspx?>

guid=%7BCB1B41D1-5D56-414F-8A29-B0273495D494%7D&dist=hppr  
406 Preeclampsia, also known as toxemia, is a complex disorder that affects about 5 to 8 percent of pregnant women.

You're diagnosed with preeclampsia if you have high blood pressure and protein in your urine after 20 weeks of pregnancy.

The condition most commonly shows up after you've reached 37

weeks, but it can develop any time in the second half of pregnancy, as well as during labor or even after delivery (usually in the first 24 to 48 hours). Preeclampsia causes your blood vessels to constrict, resulting in high blood pressure and a decrease in blood flow that can affect many organs in your body, such as your liver, kidneys, and brain. When less blood flows to your uterus, it can mean problems for your baby, such as poor growth, decreased amniotic fluid, and placental abruption -

when the placenta separates from the uterine wall before delivery. In addition, your baby may suffer the effects of prematurity if you need to deliver early to protect your health.

407 National Diabetes Statistics, 2007; [http://](http://diabetes.niddk.nih.gov/dm/pubs/statistics/)

[diabetes.niddk.nih.gov/dm/pubs/statistics/](http://diabetes.niddk.nih.gov/dm/pubs/statistics/)

408 Extracellular and intracellular magnesium depletion in pregnancy and gestational diabetes; Bardicof M et al; Am J Obstet Gynecol. 1995 Mar;172(3):1009-13. [http://www.ncbi.nlm.nih.gov/](http://www.ncbi.nlm.nih.gov/pubmed/7892840)

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409 Gestational Diabetes and Insulin Resistance: Role in Short- and Long-Term Implications for Mother and Fetus; Patrick M. Catalano et al; The American Society for Nutritional Sciences J. Nutr . 133:1674S-1683S, May 2003; [http://jn.nutrition.org/cgi/](http://jn.nutrition.org/cgi/content/full/133/5/1674S)

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413 W. Davis and F. Ziady, “The Role of Magnesium in Sleep,” Montreal Symposium

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416 Clinical Cardiology 20: 265–68, 1997

417 Eating plan rich in fruits and vegetables, and low-fat or non-fat dairy; recommended for people with pre-hypertension or hypertension; has been proven to lower blood pressure in studies sponsored by the National Institutes of Health; has been proven to lower blood pressure in just 14 days, even without lowering sodium intake

418 Karppanen H, Karppanen P, Mervaala E. Why and how to implement sodium, potassium, calcium, and magnesium changes in food items and diets? Institute of Biomedicine, Pharmacology, University of Helsinki. J Hum Hypertens. 2005 Dec;19Suppl 3:S10-9.

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[RecordID=481&tab=HC](http://www.mskcc.org/mskcc/html/11571.cfm?RecordID=481&tab=HC)

420 [http://www.umm.edu/altmed/ConsSupplements/Interactions/](http://www.umm.edu/altmed/ConsSupplements/Interactions/Magnesiumcs.html)  
[Magnesiumcs.html](http://www.umm.edu/altmed/ConsSupplements/Interactions/Magnesiumcs.html)

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422 Magnesium , 1988, vol 7.



423 Preeclampsia, also known as toxemia, is a complex disorder that affects about 5 to 8 percent of pregnant women.

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when the placenta separates from the uterine wall before delivery. In addition, your baby may suffer the effects of prematurity if you need to deliver early to protect your health.

424 Stolkowski J. Magnesium in animal and human reproduction Rev Can Biol. 1977 Jun; 36 (2):135-77.

425 Study by Edward O. Laumann, PhD; Anthony Paik, MA; Raymond C. Rosen, PhD; JAMA 2/9/99.

426 Christopher Gearon; The Search For A Female Viagra; <http://health.discovery.com/centers/womens/viagra/viagra.htm> 427 Omu AE, Al-Bader AA, Dashti H, Oriowo MA. Magnesium in human semen: possible role in premature ejaculation. Department of Obstetrics and Gynaecology, Faculty of Medicine, Kuwait University, Safat. Arch Androl. 2001 Jan-Feb;46(1):59-66.

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The First Department of Internal Medicine, Hiroshima University School of Medicine, 1-2-3 Kasumi, Minamiku, Hiroshima, Japan 429 Magnesium,

The Nutrient That Could Change Your Life:

<http://www.mgwater.com/rod07.shtml>

430 <http://www.bioticsresearch.com/PDF/Thyrostim.pdf> 431 Folic acid, vitamins E, B6 and B12, iron, magnesium, zinc and selenium deficiencies have been known to cause infertility that is easily reversible with supplementation (McLeod, 1996).

432 Howard JM, Davies S, Hunnisett A. 1994. Red cell magnesium and glutathione peroxidase in infertile women- effects of oral supplementation with magnesium and selenium. *Magnesium Research* 7(1):49x57

433 Women are another group of drug consumers who should be especially concerned with drug-induced nutrient depletion. Few women know that oral contraceptives lower the levels of such vital nutrients as Vitamin B2, B6, and B12, Vitamin C, folic acid, magnesium and zinc. Mainstream hormone replacement (chiefly Premarin, but also Estratab and raloxifene) can also lead to deficiencies in Vitamin B6, magnesium and zinc. *Drugs That Deplete-Nutrients That Heal* a review of the book *Drug Induced Nutrient Depletion Handbook* by Pelton et al. <http://www.lef.org/>

[magazine/mag2000/july2000\\_review.html](http://www.lef.org/magazine/mag2000/july2000_review.html)

434 Institute of Medicine advisory: Reducing preterm birth; Causes, Consequences and Prevention; National Academies Press, June 2006; <http://www.nap.edu/catalog/11622.html> 435 Rats kept severely magnesium depleted (receiving 1/200

the control magnesium intake) for the entire 21-day period of gestation had no living fetuses at term (Hurley and Cosens, 1970, 1971; Hurley, 1971; Hurley et al. , 1976). The shorter the duration of the magnesium deficiency, the fewer implantation sites were affected. When the deficiency was maintained from day 6-12, about 30 percent of the implantation sites were involved and 14 percent of the full-term fetuses had gross congenital abnormalities (cleft lip, hydrocephalus, micrognathia or agnathia, clubbed feet, adactyly, syndactyly, or polydactyly, diaphragmatic hernia, and heart, lung, and urogenital anomalies).

Milder magnesium deficiency (1/130 control intake) maintained

throughout pregnancy resulted in resorption of half the implantation sites and malformation of the living young at term.

436 Magnesium Deficiency in the Pathogenesis of Disease, Seelig, M; Part 1, chpt. 2. <http://www.mgwater.com/Seelig/>

Magnesium-Deficiency-in-the-Pathogenesis-of-Disease/  
chapter3.shtml

437 There is mounting evidence of magnesium insufficiency during pregnancy. Experimental acute magnesium deficiency has caused increased parathyroid secretion and even parathyroid hyperplasia (Larvor et al. , 1964a; Kukolj et al. , 1965; Gitelman et al. , 1965, 1968a,b; Lifshitz et al. , 1967; Sherwood et al. , 1970, 1972; Targovnik et al. , 1971). Thus, the possibility that magnesium deficiency is contributory to hyperparathyroidism of pregnancy, which is common despite widespread supplementation with calcium and vitamin D.

438 Infants at greatest risk of neonatal hypomagnesemia are low-birth-weight infants, including those suffering from intrauterine growth retardation (IUGR) or premature infants recovering from birth hypoxia or later respiratory distress, and infants born to very young primiparous women or to young mothers who have had frequent pregnancies or multiple births, to preeclamptic mothers, and to diabetic mothers. The incidence of neonatal magnesium insufficiency may be greater than suspected.

The tendency of women with preeclampsia or eclampsia to develop rising plasma magnesium levels during the last month of pregnancy, even without magnesium therapy, despite which they retain high percentages of parenterally administered pharmacologic doses of magnesium, suggests that magnesium deficiency might be far more common during pregnancy than is indicated by the incidence of hypomagnesemia. MAGNESIUM

DEFICIENCY IN THE PATHOGENESIS OF DISEASE, Seelig, M; Part 1, chpt. 2.<http://www.mgwater.com/Seelig/Magnesium-Deficiency-in-the->

Pathogenesis-of-Disease/chapter3.shtml 439 Magnesium chloride or magnesium sulfate: A genuine question; Magnesium Research . Volume 18, Number 3, 187-92, September 2005

440 Sudden infant death syndrome (SIDS) is defined as the sudden death of an infant or young child, which is unexpected by history, and in which a thorough postmortem fails to demonstrate an adequate cause for death. SIDS accounts for 35 percent of post-natal deaths.

441 Two clinical forms of chronic gestational Mg deficiency in women have been stressed: Premature labor when chronic maternal Mg deficiency is involved in uterine hyperexcitability, Sudden Infant Death Syndrome (SIDS) when it is caused by either simple Mg deficiency or various forms of Mg depletion. If gestational Mg deficiency is the only cause for uterine overactivity, nutritional Mg supplementation constitutes the

etiopathogenicatotoxicolytic treatment. Mg deficiency or various forms of Mg depletion. SIDS may be caused by the fetal consequences of maternal Mg deficiency through an impaired control of Brown Adipose Tissue (BAT) thermoregulation, mechanisms leading to a modified temperature set point. SIDS may result from dysthermias: hypo- or hyperthermic forms. A possible prevention could rest on simple maternal nutritional Mg supplementation. SIDS might be linked to an impaired maturation of both the photoneuroendocrine system and BAT. A preventive treatment of this form of SIDS should associate atoxic nutritional Mg therapy for pregnant women with total light deprivation at night for the infant. New data on the importance of gestational Mg deficiency. Durlach; Magnes Res. 2004 Jun; 17(2):116-25 EntrezPubMed

442 Published findings in mothers of victims of sudden infant death syndrome (SIDS) and in the SIDS victims are compared with characteristics of magnesium deficiency in humans and animals. Observations concerning the level of magnesium in traditional diets of selected ethnic groups with the highest or lowest rates of SIDS appear to confirm the importance of magnesium in protecting the offspring from sudden death. The apparent impact of gestational magnesium (Mg) deficiency on the sudden infant death syndrome (SIDS); Cardell; MagnesRes. 2001

Dec;14(4):291-303

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444 Magnesium Sulfate in Obstetrics: current data JGynecolObstetBiolReprod (Paris). 2004 Oct;33(6 Pt 1):510-7

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449 A synergism of antigen challenge and severe magnesium deficiency on blood and urinary histamine levels in rats. Wei W, Franz KB. J Am Coll Nutr. 1990 Dec;9(6):616-22. EntrezPubmed 450 Crit Care Med . 1995 Jan;23(1):108-18. EntrezPubmed 451 Magnesium provides significant protection against temporary threshold shift, complementing the previous permanent threshold shift human study. Both human noise-induced hearing

loss studies introduced a novel, biological, natural agent for prevention and possible treatment of noise-induced cochlear damage in humans Reduction in noise-induced temporary threshold shift in humans following oral magnesium intake . ClinOtolaryngol Allied Sci. 2004 Dec;29(6):635-41. EntrezPubmed 452 In a prospective, randomized, double-blind, placebo-controlled trial, 28 patients with idiopathic sudden sensorineural hearing loss were treated with either steroids and oral magnesium (study group) or steroids and a placebo (control group). Compared to the controls, the magnesium-treated group had a significantly higher proportion of patients with improved hearing (>10 dB hearing level) across all frequencies tested, and a significantly greater mean improvement in all frequencies.

Analysis of the individual data confirmed that more patients treated with magnesium experienced hearing improvement, and at a larger magnitude, than control subjects. Nageris BI, Ulanovski D, Attias J. Ann OtolRhinolLaryngol 2004;113:672-675.

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455 Magnesium Deficiency Accelerates Cellular Senescence in Human Fibroblasts <http://www.americanaging.org/2005/kililea.pdf> 456 Magnesium deficiency in critical illness. J Intensive Care Med . 2005 Jan-Feb;20(1):3-17. EntrezPubmed 457 Role of Magnesium in Disorders of the Aged; Mildred S.

Seelig, M.D., M.P.H., F.A.C.N. <http://www.centerforantiaging.com/>

Role of Magnesium in Disorders of the Aged.htm 458 The prevalence of edentulism, having no natural teeth, was higher for people age 85 and over (38 percent) than for people age 65-74 (24 percent). Socioeconomic differences are large. Forty-six percent of older people with family income below the poverty line reported no natural teeth compared with 27

percent of people above the poverty line.

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12homicide.html?\_r=2&th&emc=th&oref=slogin&oref=slogin 470 Murck H. Magnesium and Affective Disorders. *Nutr Neurosci.*, 2002;5:375-389: Murck showed many actions of magnesium ions supporting their possible therapeutic potential in affective disorders. Examinations of the sleep-electroencephalogram (EEG) and of endocrine system points to the involvement of the limbic-hypothalamus-pituitary-adrenocortical axis because magnesium affects all elements of this system. Magnesium has the property to suppress hippocampal kindling, to reduce the release of adrenocorticotrophic hormone (ACTH) and to affect adrenocortical sensitivity to ACTH. The role of magnesium in the central nervous system could be mediated via the N-methyl-D-aspartate-antagonistic,  $\gamma$ -aminobutyric acid A-agonistic or the angiotensin II-antagonistic property of this ion. A direct impact of magnesium on the function of the transport protein p-glycoprotein at the level of the blood-brain barrier has also been demonstrated, possibly influencing the access of corticosteroids to the



brain. Furthermore, magnesium dampens the calcium ion-protein kinase C related neurotransmission and stimulates the Na-K-ATPase. All these systems have been reported to be involved in the pathophysiology of depression. Murck et al. also demonstrated induced magnesium deficiency in mice to produce depression-like behavior that was beneficially influenced with antidepressants.

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depressed patients had taken Cymbalta and the deaths represent a 0.097% suicide rate. Besides, it said, it is the underlying depression - not the drug - that causes sufferers to become suicidal. FDA defended Lilly's position. Later a higher than expected rate of suicide attempts was observed in the open-label extensions of controlled studies of Cymbalta for stress urinary incontinence (SUI) in adult women.

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