# **Magnesium Extraordinaire - Part 1**

by Lady Carla Davis, MPH Specializing in Nutrition

When I first learned about magnesium (Mg) in 1963, hardly anyone ever mentioned this mineral or was aware of its vital role in the human body. From my research, I learned that my kidney stones were from a Mg deficient <u>liquid diet</u> that I foolishly embarked upon for a short time. After this product caused the death of several people, the company stopped selling it.

Previously, in 1957, my mother also suffered from kidney stones because of a magnesiumdeficient diet. Back then, the protocol was surgery to remove her kidney, which she did upon her specialist's recommendation. Two years later (1959), additional kidney stones formed in her remaining kidney because her Mg deficiency was never addressed or even brought to her attention. Again, the protocol was to cut her open and remove 15% of her remaining kidney. Then, her specialist gave her the drug streptomycin, which made her deaf at age 35!

Despite such brutal medical malpractice, she survived. However, with four small kids, her Mg deficiency, surgeries, drugs, and medical malpractice had a terrible, life-long impact on our family. This also taught me that medical protocol was not trustworthy, drugs had harmful side effects, and sufficient Mg was necessary to prevent kidney stones. I also learned that a supplement of another mineral, manganese (Mn), could have prevented her inner ear nerve damage and subsequent hearing loss.

To help prevent a repeat of what happened to my mother or me, I learned a great deal about the many vital functions of Mg and the perils of a Mg imbalance or deficiency. Today, every health-conscious practitioner and most people know about the benefits of magnesium extraordinaire!

Not only does Mg in balance with other minerals (e.g., calcium and phosphorous) prevent the formation of kidney stones, but it also plays a crucial role in hundreds of other vital functions.

## **CHEMISTRY OF MAGNESIUM**

Magnesium, Mg is a silver-white metal among five other alkaline earth series. Its atomic number is 12 in the periodic table. When used in pyrotechnics, it burns with a brilliant white flame that includes ultraviolet wavelengths. Mg is also in fireworks, marine flairs, and theatrical effects such as lightning and pistol flashes. This bright light of Mg is activated when it performs hundreds of vital tasks in the human body.

Mg is the eighth most abundant element in the Earth's crust and the fourth most common element in the Earth (after iron, oxygen, and silicon). It makes up 13.9% of the planet's mass. Mg is the third most abundant element dissolved in seawater, after sodium and chlorine.

Naturally, Mg occurs only in combination with other elements, where it almost always has a +2 oxidation state. When produced in nature, it is highly reactive and burns with its characteristic <u>brilliant-white light</u>. But, when in the atmosphere, it forms a thin film of oxide that partly inhibits its reactivity. As above, so is below. The human body is a miniature Universe.

## Magnesium in plants

The vital interaction between <u>phosphate</u> and magnesium ions makes Mg essential to the <u>nucleic acid</u> chemistry of every cell of all known living organisms. <u>Plants</u> require magnesium to synthesize <u>chlorophyll</u>, which is vital for <u>photosynthesis</u>. Mg, in the center of the <u>porphyrin ring</u> in chlorophyll, functions like iron in the center of the porphyrin ring in <u>heme</u>. Mg deficiency in plants causes late-season yellowing between leaf veins, especially in older leaves. It can be eliminated by either applying <u>Epsom salts</u>, or crushed <u>dolomitic</u> <u>limestone</u>, to the soil.

## Magnesium in the Body

To fully understand and appreciate the workings of magnesium in the body, it helps to learn some chemistry and a bit of history.

An *ion* is an atom or molecule with a net electrical charge. A *cation* is a positively charged *ion* with fewer electrons than protons that moves downward. An *anion* is a negatively charged *ion* with more electrons than protons that moves upward. Opposite electric charges are pulled towards one another by <u>electrostatic force</u>. Thus, *cations* and *anions* attract each other and readily form <u>ionic compounds</u>.

In 1834, English <u>polymath</u> <u>William Whewell</u>) and English physicist and chemist <u>Michael</u> <u>Faraday</u> devised the words <u>anode</u> and <u>cathode</u>, in addition to <u>anion</u> and <u>cation</u> as <u>ions</u> attracted to the respective electrodes.

The Mg <u>cation</u> is the second-most-abundant *cation* in seawater and sea salt. Mg is highly reactive and reactivates with water at room temperature. In the human body, it is the eleventh most abundant element by mass.

Every cell in the body contains Mg. 60% of Mg in the body is present in the bones, while the rest is in muscles, soft tissues, and fluids, including blood.

Mg is essential to all cells. Over 300 <u>enzyme reactions</u> require magnesium ions for their <u>catalytic action</u>, including all enzymes using or synthesizing <u>ATP</u> and those that use other <u>nucleotides</u> to synthesize <u>DNA</u> and <u>RNA</u>. The ATP molecule is in a <u>chelate</u> with a magnesium ion.

## **BENEFITS of MAGNESIUM**

Mg is involved in hundreds of reactions in the body, such as

- Energy Creation to convert food into energy.
- Coronary and Heart Function and Regulation to help balance blood pressure.

- Gene Maintenance to help create and repair DNA and RNA.
- Muscle Movements, aiding in muscle contraction and relaxation.
- Nervous System Regulation of neurotransmitters to send messages throughout your brain and nervous system.
- Protein Formation to create new proteins from <u>amino acids</u>.

## Magnesium:

- Alleviates morning sickness in pregnancy (Pregnancy hormones inhibit the body's ability to absorb magnesium, which causes a vicious cycle. A Mg deficiency produces excess cortisol, which causes nausea that leads to more stress, requiring a higher amount of Mg);
- Alleviates pain and is anti-inflammatory;
- Assists in bone formation and joint and skeletal health;
- Assists in the absorption of vitamin D, calcium, and vitamin K2;
- Assists in the vitamin D pathways (Vitamin D deficiency is present in immune dysfunction and many diseases, including various cancers, arthritis, osteoporosis, and mental illness);
- Assists in the production of GABA, which controls the production of hormones like serotonin that produce calmness and well-being;
- Assists the mitochondria in ATP (adenosine triphosphate) production for energy;
- Assists with heart rhythm and calcium to normalize blood pressure;
- Dilates the blood vessels to allow blood flow to the extremities, benefiting people with Raynaud's syndrome;
- Enhances sports performance;
- Enhances the effectiveness of nutrition, medical treatments, surgery, acupuncture, and chiropractic care;
- Helps to overcome insomnia and asthma;
- Helps to overcome constipation and headaches;
- Helps to overcome depression, defensiveness, and aggressive behavior;
- Helps to overcome muscle spasms, aches, and pains;
- Helps to protect the body against environmental stresses, especially in children and the elderly;
- Participates as a co-factor for many other nutrients and hundreds of enzyme activities;
- Participates as a natural and effective muscle relaxant, anti-inflammatory, and calciumchannel blocker;
- Promotes coronary and heart health;
- Reduces the harmful effects of stress and ADHD in children;
- Supports healthy blood sugar levels and insulin sensitivity;
- Works to prevent heart palpitations and heart attacks/cardiac arrests. (The highest amounts of magnesium are in the heart, specifically within the heart's left ventricle);
- Works with potassium to prevent painful leg or foot muscle cramps.

## **MAGNESIUM IN NUTRITION & DIET**

Foods containing Mg are only Mg-rich if they are organically grown by a farmer that uses nutrient-rich fertilizer containing magnesium.

Organic spices, nuts, cereals, and cocoa are good sources of magnesium. This is why women often crave dark chocolate before their period when their body's level of Mg drops.

Unfortunately, most chocolate contains sugar that depletes Mg. Green leafy vegetables,



such as spinach, kale, and chard, are rich in magnesium. <u>Magnesium Rich Foods</u>

- Pumpkin seeds: 156 mg/oz/28g -37% of the DV
- Quinoa: 118 mg/1cup/180g 28% of the DV
- Chia seeds: 111 mg/oz/28g 26% of the DV
- Almonds dry roasted: 90 mg/oz/28g 19% of the DV
- Spinach, boiled: 78 mg/1/2 cup/90g 19% of the DV
- Cashews: 74 mg/oz/28g 18% of the DV
- Black Beans, cooked: 60 mg/  $\frac{1}{2}$  cup/86g 14% of the DV
- Baked Potato with skin: 49 mg/2.5oz/98g -10% of the DV
- Brown Rice, cooked: 42 mg/½ cup/100g 10% of the DV
- Yogurt, plain, low-fat: 42 mg/8oz/224g 10% of the DV
- Oatmeal: 36 mg/1 packet 9% of the DV
- Banana: 32 mg/1 medium 8% of the DV
- Salmon cooked: 26 mg/3oz/85g 6% of the DV
- Halibut cooked: 24 mg/3oz/85g 6% of the DV
- Raisins: 23 mg/1/2 cup/100g 5% of the DV
- Avocado: 22 mg/1/2 cup/100g 5% of the DV
- Beef, ground 90% lean, broiled: 20 mg/3oz/85g 5% of DV
- White Rice, cooked:  $10 \text{ mg}/\frac{1}{2} \text{ cup}/85\text{g} 2\%$  of the DV

**Rooibos Tea,** organic from South Africa, contains Mg and is rich in antioxidants and flavonoids. It is low in tannins, caffeine-free, and served either warm or cold.

#### **Dietary Recommendations**

In the <u>UK</u>, the <u>Recommended Daily Values</u> for magnesium are 300 mg for men and 270 mg for women. In the United States, the <u>Recommended Dietary Allowances</u> (RDAs) are 400 mg for men ages 19–30 and 420 mg for older; for women, 310 mg for ages 19–30 and 320 mg for older. However, these levels do not reflect how much Mg is required to maintain good health in today's stressful world. True dietary recommendations vary, depending on many factors, such as age, body type, lifestyle, health, medications, environment, and biochemical individuality.

## Mg supplements come in many forms:

- magnesium aspartate
- magnesium chloride
- magnesium citrate
- magnesium glycinate
- magnesium lactate
- magnesium malate
- <u>magnesium oxide</u>
- magnesium sulfate/Epsom Salts/
- magnesium taurate

Each form has its merit. However, cheaper forms such as Mg oxide and Mg carbonate are less bioavailable than other forms.

Excess Mg is a rarity as it is necessary for hundreds of body functions and is often deficient. Plus, excess Mg is cleared from the body by the kidneys. However, people with renal problems, kidney failure, or Addison's disease are more likely to absorb too much magnesium.

Symptoms of excess Mg (<u>hypermagnesemia</u>) include lethargy, facial flushing, diarrhea, nausea, muscle weakness, low blood pressure, urine retention, and breathing difficulties.

**Magnesium Chloride** (MgCL2), is well absorbed and has many benefits. In North America, it is produced primarily from Great Salt Lake brine. Other sources are the Dead Sea brine in the Jordan Valley or the evaporation of seawater. It comes in higher concentrates as the mineral <u>bischofite</u> (MgCL2.6H2O) from ancient seabeds such as the <u>Zechstein seabed</u> in NW Europe. Hydrated Mg chloride (MgCL2.*n*H2O) is highly soluble in water.

**Transdermal Magnesium Chloride** is the most bioavailable form of Mg chloride. It also bypasses problems associated with oral Mg supplements (e.g., loose bowels).

<u>Elektra</u> uses Mg chloride in its transdermal creams, lotion, and oil, making it superior to other brands. They are available in the USA at <u>Magnesium Via Skin</u>.

**Terra Aqua** and **Mia Aqua, by Masters of Health Spa** (under development), are two divine, chakra-balancing body spray mists that nourish with Mg chloride and essential oils while producing a heavenly experience.

Magnesium Sulfate/Sulphate (MgSO4) crystalizes as <u>hydrates</u> and loses water upon heating. Mg sulfate monohydrate is the form most used in agriculture. <u>Mg sulfate</u> <u>heptahydrate is Epsom Salts</u>. The WHO recommends <u>Mg sulfate heptahydrate</u> for medical injection.

Since 1618, practitioners have used Mg sulfate (MgSo4) to treat arrhythmia, constipation, high blood pressure, injuries, poisoning from lead, barium, and chloride, seizures, aches, muscle pain, sore feet, and other ailments. Also, it is used as a bronchodilator for asthma and is on the WHO's list of essential medicines.

**Epsom Salts** (MgSO4.7H2O) are crystals of hydrated <u>Mg sulfate heptahydrate</u> that come from a bitter saline spring in <u>Epsom in Surrey</u>, England. It is a natural source of both magnesium and <u>sulfur</u>. Epsom salts are a purgative, <u>exfoliant</u>, muscle relaxer, and pain reliever in baths. However, these are different from Epsom salts used for gardening because they contain aromas and perfumes which are unsuitable for plants.

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## Read Magnesium Extraordinaire - Part 2 in the November issue of Masters of Health Magazine

## **MAGNESIUM EXTRAORDINAIRE - PART 2**

by Lady Carla Davis, MPH Specializing in Nutrition

## MAGNESIUM DEFICIENCIES

According to numerous studies and the NIH, over 68-80% of Americans are deficient in magnesium. Learning about magnesium extraordinaire provides a better understanding of how a magnesium (Mg) deficiency contributes to the current health crisis.

Mg is absorbed into the bloodstream through the small intestine. However, Mg absorption can be blocked or hindered by many factors, including hormonal imbalance, thyroid disease, alcohol, highly processed food (junk food), medications, fluoride, high doses of calcium, and several other Mg destroyers. Without sufficient Mg in balance, calcium cannot adequately be absorbed or utilized.

One of the leading researchers on Mg deficiency, the late <u>Dr. Mildred Seelig</u>, found that many of the side effects of drugs are symptoms of Mg deficiency. The drugs either increased the demand for Mg or depleted Mg in the body. Her brilliant research provides a wealth of information on the importance of Mg extraordinaire.

The Physician's Desk Reference lists these common drugs that can create a Mg deficiency:

• Common diuretics and cardiac drugs

- Birth control pills
- Insulin
- Digitalis
- Tetracycline and other antibiotics
- Cortisone

In addition, many other drugs (e.g., tubocurarine, barbiturates, hypnotics, and narcotics) can negatively interact with Mg.

## MAGNESIUM DESTROYERS (Source: Herbpower21)

- Agricultural chemicals, pesticides, and herbicides, such as <u>glyphosate</u>, block the absorption of Mg.
- Alcohol depletes Mg.
- Carbonated beverages and processed foods, like cold-cut meats, contain phosphates that bind to Mg molecules and flush them out of the body.
- Coffee works like a diuretic that flushes Mg and other nutrients from the body.
- Dry roasting nuts remove the highly nutritious oils that contain Mg.
- Fluoridated, softened, or distilled water depletes Mg.
- Milling flour from grains strips Mg from the grain.
- Some foods like nut skins, seeds, grains, maize, legumes, soybeans, pinto beans, and raw spinach are high in phytic acid or oxalic acid compounds that bind to minerals and hinder their absorption.
- Sugar in any amount depletes Mg.

## **Calcium Factor**

The balance between calcium (Ca) and Magnesium (Mg) is critical. For movement, electrical impulses transmit signals to the nerves and brain. Ca, the conductor for these impulses enters the cells through Ca channels operated by Mg. Once Ca does its job, Mg helps the body remove it from the cells. When Mg is insufficient, these electrical impulses are hindered and Ca builds up in the soft tissues, which can cause angina, arrhythmia, asthma, defensiveness, headaches, and hypertension. This is why Mg is often called the

'Nature's Ca channel blocker.'

## Metabolism

Digestive enzymes require ample amounts of HCL (hydrochloric acid) in the stomach to efficiently digest food and change dietary minerals into an absorbable form. A stomach acid deficiency hinders the absorption of Mg and other minerals needed from food, which leads to many illnesses. Antacids and soda only worsen this condition.

Deficiencies of HCL and Mg are common in the elderly and people with arthritis, asthma, depression, diabetes, gallbladder disease, osteoporosis, and gum disease.

Early signs of a Mg deficiency include chronic constipation, anxiety, headaches and migraines, insulin resistance, PMS, depression, leg cramps, muscle twitches, and edema. These early symptoms indicate a Mg deficiency. If untreated, a Mg deficiency can lead to more life-threatening conditions such as heart disease, hypertension, stroke, type 2 diabetes, and osteoporosis, to name a few. For testing, a hair analysis is a better indicator of a long-term Mg deficiency than a blood test, as blood analysis can fluctuate from hour to hour.

An adult body has 22–26 grams of Mg, with 60% in the skeleton (20% in skeletal muscle), 39% intracellular, and 1% extracellular. Serum levels are typically 0.7–1.0 mol/L or 1.8–2.4 mEq/L. Serum Mg levels may be normal even when intracellular Mg is deficient. The mechanisms for maintaining the Mg level in the serum are varying gastrointestinal absorption and renal excretion. Intracellular Mg correlates with intracellular potassium. Mg lowers calcium and can either prevent hypercalcemia or cause hypocalcemia depending on the ratio. Both low and high protein intake conditions can inhibit Mg absorption, as does the amount of phosphate, phytate, and fat in the gut. Unabsorbed dietary Mg is excreted in feces; absorbed Mg is excreted in urine and sweat.

An increased renal or gastrointestinal loss, an increased intracellular shift, or a proton-pump inhibitor for antacid therapy can also cause an imbalance. Most are asymptomatic, but symptoms such as neuromuscular, cardiovascular, and metabolic dysfunction may occur. Alcoholism is often associated with Mg deficiency. Chronically low serum Mg levels are associated with metabolic syndrome,

diabetes mellitus type 2, fasciculation, and hypertension.

Bone LossInyperinsumental, metabolic syndrome)Or Spashispincking, numbress, pain, pin, needles, stabbing, shocking, tingling, twitching, tics)Bowel DiseaseEpilepsyJaw spasms (TMJ)stabbing, shocking, tingling, twitching, tics)Brain SwellingHeadaches, MigrainesNeck & Back Paintingling, twitching, tics)Bruxism (teeth grinding)Head Trauma, BleedingNeurologicalSports InjuriesCalcificationHearing LossManifestationsSports RecoveryCancer PreventionHeart DiseaseMuscle WeaknessStrep BacteriaCarbunclesblood pressure)OsteoporosisSyndrome (SIDS)Cardiac ArrestHyperemotionalityPremenstrual SyndromeTemporomandibularChemotherapy SideHyper-HypoglycemiaDysmenorrheaTetanus	Acidosis Acid Reflux Adrenal Fatigue Alcoholism Allergies, Hay Fever Altitude Sickness Alzheimer's Disease Angina Anxiety, Panic Attacks Arrhythmia Arthritis Asthma Atherosclerosis Attrail Fibrillation Bi-Polar Disorder Blood Clots Blood Sugar Imbalance Bone Loss Boils Bowel Disease Brain Swelling Bruxism (teeth grinding) Calcification Cancer Prevention Carbuncles Cardiac Arrest Cerebral Palsy Chemotherapy Side	Cholesterol Imbalance (low LDL, high HDL) Chronic Fatigue Syndrome (CFS) Complex Regional Pain Syndrome Cirrhosis Confusion Constipation Constipation Constipation Convulsions Cramps Cystic Fibrosis Cystitis Defensiveness Dementia Depression Detoxification Diabetes (syndrome X, hyperinsulinemia, metabolic syndrome) Epilepsy Headaches, Migraines Head Trauma, Bleeding Hearing Loss Heart Disease Hypertension (high blood pressure) Hyperemotionality Hormone Issues	Infection Infertility Inflammation Insomnia Interstitial Cystitis Irritability Irritable Bowel Syndrome (IBS) Kidney Disease Kidney Stones Lyme Disease Mania Memory Loss Multiple Sclerosis Musculoskeletal Muscle Cramps Fibrositis Fibromyalgia GI Spasms Tension Headaches Jaw spasms (TMJ) Neck & Back Pain Neurological Manifestations Muscle Weakness Obstetrics/Gynecology Osteoporosis Premenstrual Syndrome (PMS, Dysmenorthea	<ul> <li>Premature Labor</li> <li>Preeclampsia,</li> <li>Eclampsia</li> <li>Pancreatic Infections</li> <li>PTSD</li> <li>Palpitations</li> <li>Parkinson's Disease</li> <li>Poisoning</li> <li>Raynaud's Syndrome</li> <li>Restless Legs</li> <li>Seizures</li> <li>Sickle Cell Disease</li> <li>Skin Dryness, Aging,</li> <li>Infections, Ulcers</li> <li>Skin Sensitivity</li> <li>(burning, crawling,</li> <li>creeping, itching,</li> <li>prickling, numbness,</li> <li>pain, pin, needles,</li> <li>stabbing, shocking,</li> <li>tingling, twitching, tics)</li> <li>Sports Injuries</li> <li>Sports Recovery</li> <li>Strep Bacteria</li> <li>Sudden Infant Death</li> <li>Syndrome (SIDS)</li> <li>Temporomandibular</li> <li>Joint Syndrome (TMJ)</li> <li>Tetanus</li> </ul>
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#### SYMPTOMS OF A MAGNESIUM DEFICIENCY OR IMBALANCE

Trigeminal Neuralgia Urinary Incontinence Vertigo Wound healing

## Causes

Poor diet, alcohol, impure water, fluoride, GMOs, food additives, processed junk foods, refined sugar, gluten, damaged oils, drugs (recreation and pharmaceutical), toxic agriculture chemicals, pesticides, and herbicides such as glyphosate residues deplete Mg. In addition, stress (emotional, biochemical, or environmental) cause a rapid and massive depletion of Mg from the body. The Western diet and lifestyle contribute to a Mg deficiency and all the ailments (listed above) attributed to it.

Plus, a Mg deficiency worsens with age, which is why some people are sicker, less stress-tolerant, and more prone to depression and PTSD as they grow older.

## Tips

- Avoid coffee, alcohol, carbonated, and sugary beverages. Drink spring water.
- Increase stomach acid. Low stomach acid which can result from digestive disorders or by taking antacids prevents minerals like Mg from being adequately absorbed. A supplement containing betaine hydrochloride (HCL) increases stomach acid levels when needed.
- Eat organic, Mg-rich foods. Avoid highly processed foods. Find an organic, regenerative agriculture farmer that uses Mg-enhanced fertilizer to condition depleted soil and maximize nutrient content. Whenever possible, eat organic or pasture-fed meat and raw or steamed vegetables (heated to no more than 110°F) at each meal. Steam vegetables instead of boiling them to retain nutrients.
- Snack on sprouted, organic nuts and seeds. The process of sprouting releases the phytic acid that causes Mg depletion. It also helps retain enzymes that help your body digest the nuts and seeds. While all nuts and seeds contain Mg, pumpkin seeds are a particularly rich source. Make sure they are not rancid.

## **MAGNESIUM THERAPIES**

- Intravenous Mg is recommended by the ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias. It is also recommended for the Prevention of Sudden Cardiac Death for patients with ventricular arrhythmia associated with torsades de pointes who present with long QT syndrome and for treatment of patients with digoxin-induced arrhythmias.
- Mg sulfate intravenous is used to manage pre-eclampsia and eclampsia.
- Hypomagnesemia, including that caused by alcoholism, is reversible by oral or parenteral Mg administration, depending on the degree of deficiency.
- There is evidence that Mg supplementation may play a role in migraine treatment and prevention.
- Medically, Mg compounds are common laxatives and antacids. Mg is also used to stabilize abnormal nerve excitation or blood vessel spasm in conditions such as eclampsia.

## Types of Mg salt and other therapeutic applications

- Magnesium borate, magnesium salicylate, and magnesium sulfate are antiseptics.
- Magnesium bromide is a mild sedative (this action is due to the bromide, not the magnesium).
- Magnesium carbonate powder is used by gymnasts, weightlifters, and climbers to eliminate palm sweat, prevent sticking, and improve the grip on gymnastic apparatus, lifting bars, and climbing rocks.
- Magnesium chloride, oxide, gluconate, malate, orotate, glycinate, ascorbate, and citrate are oral magnesium supplements.
- Magnesium hydroxide, suspended in water, is used in milk of magnesia antacids and laxatives.
- Magnesium stearate is a slightly flammable white powder with lubricating properties. In pharmaceutical technology, it is used in pharmacological manufacture to prevent tablets from sticking to the equipment while compressing the ingredients into tablet form.
- Magnesium sulfate, as the heptahydrate Epsom salts, are used as a bath salt, a laxative, and a highly soluble fertilizer. An Epsom salt bath is highly beneficial because of the combination of Mg and sulfate.

#### Overdose

Overdose from dietary sources alone is unlikely because the kidneys quickly eliminate excess Mg from the blood unless renal function is impaired.

#### Toxicology

Patients with kidney disease are often advised not to use Mg oil. However, a deficiency of Mg (or natural vitamin A) can cause kidney disease.

#### **MAGNESIUM OIL DEFINED**

The chemical formula for magnesium chloride hexahydrate (Mg salt flakes) is MgCl2.6H20. It is the combination of magnesium with chlorine, thereby becoming 'magnesium chloride.' Mg chloride hexahydrate salt flakes are formed via dehydration of sea water. During dehydration the sodium chloride is removed to make table salt. The remainder of the brine, also called bischofite, is 98% Mg chloride hexahydrate and 2% residual sea trace minerals. The Mg chloride flakes are inside a crystalline structure of six water molecules (ie. hexahydrate). When they are mixed with extra water (usually 30-70% concentration), the resulting solution has a slippery texture like oil, but isn't really an oil (such as plant lipids/fats) because it is a mineral electrolyte and not carbon based. The slippery feel is caused by the charge of the electrolytes structuring water molecules so that they are not random as in empty distilled water. The more Mg chloride in solution, the more structuring of the water molecules as it moves towards the hexahydrate crystalline structure of the flakes again.

#### Applications

Mg oil/lotion/cream can be applied to the skin as an alternative to oral Mg supplements. It can prevent or treat a deficiency, relieve muscle aches and pain (especially headaches), and

enhance relaxation. Mg is vital for over 600 cellular reactions within the human body, including the immune system.

*Terra Aqua* Chakra Balancing Body Mist (under development) is a divine new product that combines Mg with essential oils. It soothes and calms the body, mind, and spirit.

## TRANSDERMAL MAGNESIUM

Transdermal absorption has been part of human history for centuries, from when ancient Egyptians and others started using saunas. Mg delivered through the skin aids as a muscle relaxant and skin rejuvenator.

According to Sandy Sanderson, creator of Elektra Magnesium, "Magnesium tablets and powders are difficult for many people to digest, especially if they have low stomach acid or IBS symptoms. Magnesium tablets and powders often contain fillers and binders that can interfere with digestion. They may work well as laxatives, but studies show that high concentrations of magnesium cannot transit the gut wall, which absorbs magnesium optimally only in low amounts, as would be in natural mineral water and foods. High concentrations are mostly wasted by the digestive system.

Chelated magnesium, which are supplements of magnesium joined up with an amino acid, may have a better bioavailability in that they don't irritate the bowel so much, but you still need enough stomach acid to digest them so you can use the magnesium (which is then converted to magnesium chloride for cell use anyway). These chelated forms may be magnesium taurate, magnesium glycinate, magnesium threonate, etc. The taurine, glycine, or threonine might very well be useful and beneficial, however only a smaller portion of the magnesium part can get through the gut wall due to the narrow window of opportunity of this barrier. High concentrations are out: Low concentrations get in.

Transdermal absorption, in the form of dissolved magnesium chloride, is a more effective way to supplement with magnesium when larger amounts are needed, because no further digestion is required. Being already in the right form for cell uptake, the magnesium chloride in solution can be absorbed by the epidermis, the largest organ of the body. This is why magnesium bathing or foot-soaking works so well to calm and relax muscles quickly. The skin can also act as a storage reservoir, which the body can draw from over time as required, thereby self-regulating magnesium uptake. It works fast too - especially in the context of massage. When the skin is well conditioned with lipids (fats), the magnesium uptake is enhanced. More information about the mechanism of action is available at: <a href="https://www.elektramagnesium.com.au/magnesium-tablets-transdermalmagnesium/">https://www.elektramagnesium.com.au/magnesium-tablets-transdermalmagnesium/</a> "

## Mg Cream/Lotion/Oil Massage

The best way to ensure you have a sufficient supply of Mg extraordinaire is to nourish your body with Elektra Mg Lotion/cream/oil daily. Every evening, treat yourself to a deep-tissue leg and foot massage that presses on the lymph nodes and along the meridian lines. You can easily do this yourself. It will also help you sleep like a baby. My favorite is the large jar of Elektra's *Citrus Zest* cream; the second is the pump bottle of Elektra's Mg *Charge Lotion*. Nonetheless, all the other Mg creams (*Herbal, Sensory Gold, Island Spice*) and the

*Oil Sprits* are excellent. They each have their benefits. Elektra's *Baby Calm Balm* is superb for babies and makes a great baby gift.

These fine Mg products are available in the USA at Magnesium Via Skin. ENJOY them!

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