

## Magnesium

Magnesium is a mineral that many people are deficient in resulting in our body's inability to function properly. Over 300 different reactions in our body rely on magnesium; therefore if we are deficient, several of our body's processes will not operate correctly. It is needed for the break down of food, for bone formation, and to eliminate toxins in our body, to mention a few.<sup>1</sup> It also plays a role in making adenosine triphosphate (ATP), an energy source for the body.<sup>2</sup> Magnesium is also needed to keep cells, bones, and tissues healthy.<sup>5</sup> Although magnesium is so integral in our body's functioning we do not see symptoms of deficiency immediately because our body compensates for the loss. This does not last forever and symptoms will start to appear.

## Symptoms of Deficiency

A person can have many symptoms of magnesium deficiency because it is involved in so many parts of the body. Because magnesium aids in making ATP many people with deficiencies feel depressed or anxious, have fatigue, or feel weak. It can also cause muscle pain or cramps especially in the back or neck. Confusion, memory loss, or irritability is also associated with a deficiency.<sup>2</sup>

The deficiency can be caused by many different things including medication. Certain antibiotics or chemotherapy drugs have shown to deplete magnesium. (Ask your doctor or pharmacist if you suspect a drug may be decreasing your magnesium.) Certain foods and drinks such as those with caffeine, large amounts of sugar, or large amounts of fiber can lead to a loss of magnesium. Soda that contains phosphate binds to magnesium not allowing it to be absorbed and flushing it out of the body.<sup>6</sup> It is not always things that we are ingesting that decrease magnesium; stress, surgery and trauma have all been associated with magnesium depletion.<sup>2</sup>

Certain diseases are associated with magnesium deficiency, in which some but not all can be treated using magnesium. For example, alcoholism is associated with a deficiency, but supplementation will not treat alcoholism, although it will aid in increasing the magnesium level. The disease states that are associated with magnesium deficiency are:<sup>2</sup>

- Abnormal calcium deposits
- Aggressive behavior
- Agoraphobia
- Alcoholism
- Anxiety
- Attention deficit disorder
- Autism
- Cardiovascular disease
- Cold hands and feet
- Constipation
- Delirium
- Dementia
- Depression
- Diabetes difficulty swallowing
- Endometriosis
- Excitability
- Fatigue
- Heart attack
- Heart arrhythmia
- Hypertension
- Hypoglycemia
- Insomnia
- Lupus
- Migraine
- Mitral valve prolapse
- Numbness
- Osteoporosis
- Palpitations
- Photophobia
- Premenstrual syndrome

- Psychosis
- Schizophrenia
- Seizures
- Stress
- Tingling
- Tremors
- Urinary spasms

## Foods Containing Magnesium

Several foods contain magnesium, although some of the processing of food depletes the food of the nutrients. Cooking food can strip magnesium from food with boiling the food being the worse.<sup>3</sup> Several vegetables such as beet greens, spinach, collard leaves, sweet corn, potato, with skin and green pepper are good sources of magnesium. It can also be found in several different types of nuts and wheat. One of the best sources of magnesium is in kelp.<sup>2</sup> Getting magnesium through food sources is the most efficient way of receiving magnesium, but it is difficult to do, therefore supplementation is a great alternative.

## Recommended Dose

The recommended daily dose is different based age as well as gender with men requiring a higher dose.

<u>Age (Years)</u>	<u>Dose (mg)</u>
1-3	80
4-8	130
9-13	240
14-18	
Male	410
Female	360
19-30	
Male	400
Female	310
31-older	
Male	420
Female	320

These doses are for people who are not treating a disease with magnesium. The dosage increases based on the disease state that is being treated. The upper limit is 1-3 years is 65 mg, 4-8 years is 110 mg, 9-older is 350mg daily.<sup>4</sup> Although the upper limit is less than that of the recommended daily dose, this is the dose that side effects may begin to be seen mainly diarrhea. The toxic dose is 1000mg.<sup>7</sup> If you develop drowsiness, lethargy, weakness, or diarrhea occur it may be signs of magnesium toxicity and should be stopped. People with insufficient kidney function should use caution when taking magnesium supplements.

## Adverse Drug Reactions

The most common side effect of magnesium is diarrhea (it is often used to treat constipation). Nausea, vomiting, and stomach upset are also possible side effects. When toxic doses are taken low blood pressure, weakness, arrhythmias and drowsiness can occur. There have been a couple report of death due to magnesium toxicity at extremely high doses.<sup>4,7</sup>

## **Dosage Forms**

There are several different types of dosage forms that magnesium can be administered in as well as several different types of salt forms, all having a different type of absorption. Probably the most common dosage form is oral. It is easily tolerated and gets absorbed well. The problem with oral supplementation is the body regulates how much is absorbed based on how much the body needs. If your body has enough magnesium stored and you take an oral supplement the body will not absorb it all and it will get flushed out. For a person with a magnesium deficiency, daily oral supplementation can take 6-12 months to restore levels back to normal. If applied topically (transdermally), the levels can be restored within 4-6 weeks.<sup>1</sup> Transdermal magnesium also has some effects on the body that oral magnesium does not have, mainly it aids in the natural production of steroid hormones.<sup>5</sup> Transdermal application also bypasses the absorption in the gut so you get more magnesium in the blood versus oral. Magnesium oils, sprays and foot baths have also been developed and are effective ways of supplementing magnesium.<sup>6</sup> Lastly, for completion, in the hospitals there is an intravenous form that maybe use as well.

## **Drug Interactions**

There are several drugs that magnesium interacts with as well as some lab test. Many of the drug interactions can be managed by spacing out the magnesium supplementation from other medication by about 2 hours. Some of these drugs include certain antibiotics and bisphosphonates. Another large interaction is magnesium can enhance the effects of the other medication. This includes drugs such as blood pressure medication, diabetic drugs and muscle relaxants. Blood pressure and blood sugar should be monitored carefully if magnesium is added because both can become very low.

Certain lab test can be altered by magnesium because of the many effects magnesium has. Blood pressure readings can be lowered as well as ECG reading can be normalized.<sup>4</sup> Check with the pharmacist or doctor about any interactions with magnesium and before you begin magnesium supplementation.

## **Conclusion**

Magnesium is a vital mineral for human health. It is involved in many different pathways and reactions in the body. It is also used to treat many different disease states. Numerous people in the United States and around the world are deficient in magnesium due to inadequate intake through diet. Many people would receive a great benefit from

magnesium supplementation, including increased energy, more relaxed, and stronger bones. Talk to a doctor or pharmacist before starting magnesium to see how you could benefit from magnesium supplementation.

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Prepared by: Stacey Amberg, Pharm.D. Candidate, The Ohio State University, July 2009