

# Role of magnesium in health and disease processes



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Health concerns have become a fundamental issue in the 21<sup>st</sup> century.

People around the world are taking a more active role in matters concerning their health. The internet is loaded with information that is geared towards educating people on making healthier choices. Many factors come into play for the effective functioning of the body organs. Electrolytes such as sodium, potassium, calcium and magnesium are minute and easily can be overlooked but the impact of a deficiency of one of them on the body can be fatal. There is a paucity of information available as concerns magnesium specifically.

Most people are ignorant on the importance of this electrolyte and its interplay with human health and disease. Recent study findings indicate that the role of magnesium in health and diseases processes in the human body cannot be undermined. The study findings were published in the BMC Bioinformatics journal.

Chemical processes in the body are mediated by hormones and enzymes. Enzymes are protein compounds that act as catalyst or controls for the various reactions. The enzymes do not work in isolation and require various co factors for effectual working. Magnesium acts as a cofactor for over 300 enzymes in the human body. Of particular importance is the subset of enzymes that are tasked with regulating the process of energy (ATP) formation and utilization. The study revealed that human proteins contained binding sites for magnesium. This being the case, a deficiency of magnesium would therefore affect a wider range of biological processes.

The human DNA is the hereditary material that encodes genetic instruction used in the development and functioning of the human body. The DNA is responsible for synthesis of over 100, 000 proteins. This is a highly

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specialized process. Each protein is coded for by a specific portion of DNA known as proteome. Recently discovered 'magneseome' is the portion of DNA that codes for the proteins that bind magnesium. Consequently, deficiency of magnesium will affect the synthesis of specific proteins in the body and have impact on health and disease.

In the recent past calcium has become a popular electrolyte supplement advocated for by nutritionists and clinicians with all effort geared to avoiding or combating calcium deficiency. Calcium garnered its popularity after an inaccurate definition of osteoporosis by WHO despite contrary research findings that showed that excess calcium in the body increases risk of heart disease and subsequent mortality.

Magnesium research.

Information gathered from magnesium related studies has build up over the last 40 years with each year having about 2000 study findings published. Cumulatively, magnesium has been shown to have over 100 health benefits. The article will highlight several key therapeutic uses for magnesium.

Fibromyalgia: this is a chronic disorder that causes muscle pain, joint tenderness and fatigue. Deficiency of magnesium is a common feature of patients with fibromyalgia. Magnesium malate composed of low doses of magnesium (50mg) mixed with malic acid has been shown to provide relief for the muscle pain and joint tenderness when administered to fibromyalgia patients.

Atrial fibrillation: this is a disorder of heart rhythm and can be fatal. Study findings revealed that magnesium supplements decrease atrial fibrillation when used in isolation or together with other drugs.

Diabetes Type 2: results from study conducted in 2007 found that 13.5-47.7% of patients with type 2 diabetes have magnesium deficiency. Long term complications of diabetes include peripheral neuropathy and coronary artery disease. Research has shown that patients with lower intracellular magnesium levels are likely to develop the fore mentioned complications. Oral supplementation with magnesium has been shown to be of immense benefit to patients. It results in reduction in fasting glucose, increasing levels of HDL, improving sensitivity to insulin and better metabolic control.

Premenstrual syndrome: magnesium insufficiency has been found to be a common feature of women who suffer from premenstrual syndrome. Expectedly, magnesium has been shown to ease fluid retention, a common feature of premenstrual syndrome. In the course of a 3 month study period, women aged 18-45 were given 250mg of magnesium daily. The results showed that there was a roughly about a 34% reduction in symptoms associated with premenstrual syndrome. Together with vitamin B6, magnesium supplementation has been shown to alleviate premenstrual symptoms that are related to anxiety.

Cardiovascular disease and mortality: low magnesium levels correspond to an increased risk of mortality from cardiovascular disease. Magnesium confers a protective effect on the cardiovascular system. It achieves this through various mechanisms. It lowers the blood pressure, it prevents

spasms of the coronary arteries, it counters formation of clots within the blood vessels and acts as calcium channel blocker. Mitochondria are intracellular components that act as the site of energy production. The heart muscle is densely populated with mitochondria which require sufficient magnesium for ATP synthesis.

Migraine disorders: the journal of Neural transmission recently published an article titled “ why all migraine patients should be treated with magnesium”. The study found that the levels of magnesium in the body are not accurately reflected from routine investigations. This is because the bulk of magnesium is found in bone (67%) and that within the cells is 31%. Subsequently only 2% of body magnesium stores is in the extracellular space and this is what is picked up during investigations. The researchers advocated for empiric supplementation of magnesium in patients with migraines because lab results for magnesium levels in the body were unreliable. It has been demonstrated that magnesium supplementation orally reduces the incidence of headache days among children suffering from frequent migraine headaches. Magnesium used together with l-carnitine is effectual in reducing migraine frequency in adults.

Aging: aging is a mandatory process of life. Magnesium insufficiency has been shown to hasten the rate of aging. This was clearly demonstrated among individuals who participated in extended space flight missions. Deficient magnesium levels in these individuals have been associated with accelerated aging of the heart tissue at a rate that is 10 times faster than normal. Neuroendocrine changes and sleep changes that are related to the natural process of aging can be reversed by magnesium supplementation. A <https://assignbuster.com/role-of-magnesium-in-health-and-disease-processes/>

possible explanation in which magnesium is able to undo the processes of aging is that it is essential for DNA stability and is essential during DNA replication.

Best sources of Magnesium in the diet.

Nature is generous to us. This is because magnesium is best sourced from food. Leafy green foods are good examples of dietary sources of magnesium. This is because they contain chlorophyll the pigment necessary for photosynthesis. Chlorophyll contains an atom of magnesium at its center. Without the atom of magnesium, the plant would not be able to employ the sunlight to synthesis energy. However elemental magnesium is colorless and foods that are not green contain it. After ingestion, magnesium is absorbed more effectively if combined with food cofactors than when it is in its elemental form.

The below listed foods are rich in magnesium. The list indicates how much magnesium would be sourced from a 100 grams serving of the corresponding food.

- Crude rice bran(781mg)
- Dried seaweed agar(770)
- freeze-dried chives(640mg)
- dried coriander leaf(694mg)
- dried pumpkin seeds(535mg)
- unsweetened dry cocoa powder(499mg)
- dried basil(422mg)
- flax seeds(392mg)

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- cumin seeds(366mg)
- dried brazil nuts(376mg)
- freeze dried parsley(372mg)
- sesame seeds(346mg)
- almond nuts butter(303mg)
- roasted cashew nuts(273mg)
- defatted soy flour(290mg)
- dried sweet whey(176mg)
- dehydrated bananas(108mg)
- puffed millet(106mg)
- freeze dried shallots(104mg)
- freeze dried leeks(156mg)
- raw salmon(95mg)
- dehydrated onion flakes(92mg)
- raw kale(88mg)

Magnesium supplement formulations are also available commercially. This will be of benefit to individuals who need higher doses of magnesium or those whose palates do not tolerate the fore mentioned foods. Taking glycine together with magnesium enhances absorption of the later increasing amounts available to the body. Stool softening and laxative properties are some extra benefits on magnesium therapy experienced when a person is taking magnesium citrate or oxide.