

# MAGNESIUM AND HEART HEALTH

## **From the Cellular Level**

Nutritional magnesium is deeply involved in energy production, oxygen uptake, central nervous system function, electrolyte balance, glucose metabolism and muscle activity, including that all important muscle—the heart. To closely examine magnesium’s importance to the heart muscle, we have to pull out our microscopes—yes, it gets right down to the cellular and even the molecular level. Magnesium plays an essential role in many of the functions of energy production itself. It is an integral part of the energy and protein molecules without which the energy to contract and relax the heart does not occur properly. Magnesium is also an essential element in the construction of the cell membrane. In that the heart is composed of cells, magnesium plays a role in the integral strength of the heart muscle itself. When magnesium levels begin to get too low the body tries very hard to adapt, but these basic functions of energy production and cell structure are affected. Magnesium is important to so many aspects of the cell both in structure and function at the cellular level, the microcellular level and the protein structure level that lack of magnesium will be first felt there. Without enough magnesium, the cell is no longer able to keep up the proper number of high-energy molecules to healthfully function. But it doesn’t stop there. Once magnesium falls down below a certain level, just about everything starts to go. The sodium balance starts to go and the electrolyte balance starts to go. The cell is not able to have a fully integrated membrane system. Calcium and sodium start to rush into areas where they normally would not be and the cell begins to lose its integrity of both its electronic energy fields and its chemistry. It just starts to get weaker and weaker because it doesn’t have the energy to do all the things it needs to do.

## **Importance of Magnesium Levels**

Now, pulling back out of our microscope, how are these occurrences felt and how can they affect the individual? If a person is not getting adequate magnesium for their individual needs, they can go into what we call a marginal state. A certain trauma or onslaught to that organism can take the magnesium status from a marginal into a depleted state, which can manifest as hypertension, high cholesterol, heart disease and, if it happens suddenly, a heart attack. Such a trauma can be brought about by strenuous exercise—*something heart patients are encouraged to do*. It might be a good idea to only exercise if they have an adequate magnesium level. Exercise is really, really good. It appears from recent research that exercise makes magnesium more available, moving it from areas that don’t currently need it as much to areas that do need it. And one of those is, of course, the heart. But if magnesium is marginal, exercise can cause problems.

## **Calcium-Magnesium Balance**

A low-magnesium condition can also be exacerbated by a high intake of calcium—promoted heavily today by many health professionals. Calcium cannot be optimally utilized without a proper balance of magnesium, and a high calcium intake without magnesium will further drain any reserves of magnesium. Calcium is extremely necessary to heart and general health. Calcium is necessary at the cellular level for muscles to contract, for nerves to fire, for hormones to be secreted. But, calcium needs to be balanced with magnesium. If you give too much calcium and too little magnesium, what can tend to happen is the excited firing state of biochemistry of the cell will tend to remain that way. In a stress situation such as exercising more vigorously than usual or when someone is suddenly and unexpectedly frightened, muscle cells or nerve cells or hormone secreting cells can go into an overreaction mode—the fight or flight mode. Without magnesium they don’t come back down to resting state; they stay excited in that firing mode.

## **Magnesium and Cholesterol**

Another problem related to heart health, and one that has received considerable attention over the years, is cholesterol. A fatty substance found in many areas of the body, cholesterol in large quantities can be dangerous to health. Over time, it can build up on the walls of the arteries and can cause narrowing or hardening, leading to serious heart problems. Because cholesterol has obtained such a bad name, many may not know that it is actually produced in all cells naturally and has important bodily functions. Cholesterol comes about through a series of chemical reactions. Cholesterol is important because it is a steppingstone to the body's manufacture of sex hormones like testosterone and estrogen. One of the reactions involved in cholesterol production is called the *rate-limiting reaction* because it keeps control of the amount of cholesterol manufactured. The rate-limiting reaction requires magnesium. The enzyme for the rate-limiting reaction has two phases: an active phase and an inactive phase. The inactive phase has to have magnesium tied to it. If you don't have enough magnesium in the cell, that enzyme cannot be deactivated. As a result, that control point is weakened or absent; cholesterol continues to be manufactured and the cell cannot slow or stop it. This can result in a cholesterol buildup.

## **Stress Requirements**

Magnesium requirement during stress soars. This includes any kind of stress coming into the body from exercise, mental and emotional issues, high noise, chemicals, or any other source." Even someone regularly taking magnesium as part of a dietary program has far greater nutritional requirements when they experience a stress episode of some sort. Magnesium requirements also rise during healing from a bodily trauma such as injury or an operation. Part of any bodily healing should include a really good source of magnesium as well as other essential nutrients. Much study at the cellular, biochemical and physiological levels has shown that the stress response vitally involves the influx of calcium into cells, resulting in a drastic change in the cells' internal magnesium-to calcium ratio. During stress response, calcium ions rush inside the cell, and this alters the internal magnesium-to-calcium ratio. This change in ratio exhibits wide effects because, while magnesium and calcium are very similar in their chemistry, biologically these two elements function and react very differently."

Magnesium and calcium are two sides of a physiological coin: they are antagonistic to one another yet operate as a team. For example, calcium excites nerves; magnesium calms them down. Calcium makes muscles contract, but magnesium is necessary for muscles to relax. Calcium is necessary to the clotting reaction—essential for wound healing—but magnesium keeps the blood flowing freely and prevents abnormal thickening when clotting reactions would be dangerous. Scientific study shows more and more that the underlying cellular change enabling the stress response is a low magnesium-to-calcium ratio caused by a large and sudden influx of calcium into cells. The stress response subsides when the cells' magnesium returns to its dominant presence inside cells, moving extra calcium back to its "normal" position, thus restoring the cells' normal ratio.

## **Muscle Cramping**

If you suffer from muscle cramping... make SURE to increase your magnesium! Liquid is the best!!!