



Photo: Dee Pignéguy

Magnesium

The 'life and death' mineral

By Dee Pignéguy

The death in February 2010 of Ms Natasha Harris of Invercargill, just 30 years of age, made headlines when her partner told the news media that she died as a result of her addiction to drinking coke. The *Guardian* headline 'Coca-Cola habit linked to New Zealander's death', was just one example of the worldwide coverage.

Pathologist Dr Dan Morin told the court the main cause of Ms Harris' death was cardiac arrhythmia, but she also had a lack of potassium in the blood, which caused severe hypokalemia (*NZ Herald*, 20 April 2012).

Did coke contribute to Natasha's death?

In the battle for mouths and minds, commodity markets are increasingly dominated by the enormous advertising budgets of corporate food giants. So it was no surprise to me that none of the media stories actually dealt with the real question: did the consumption of 7.5 litres of Coca-Cola a day contribute to Natasha Harris' death? There are several things to consider, including the importance of magnesium and its interlinked relationships with other minerals, and also the acid-alkaline balance in the body.

Magnesium: a critical mineral for health

Magnesium is a critical mineral for health. It is used by every organ, especially the heart, muscles and kidneys. A deficiency of magnesium contributes to heart attacks and strokes. Magnesium contributes to energy production and helps regulate calcium, copper, zinc, potassium, vitamin D and other important nutrients.

Magnesium controls the fate of potassium and calcium in the body. A healthy cell has high magnesium and low

calcium levels. Studies show that increasing calcium in the diet reduces the absorption of magnesium. And without sufficient magnesium, calcium can collect in the soft tissues. Calcium deposits in the joints are called arthritis, in the blood vessels it is hardening of the arteries and in the heart it is heart disease.

Magnesium deficiency

Excess alcohol, calcium, salt, sugar, caffeine, carbohydrates and stress all interfere with magnesium absorption. Magnesium deficiencies can also be aggravated by prescription drugs, carbonated water, tobacco, the use of diuretics, and a high intake of starches and sodium.

Phosphates interfere with magnesium absorption. Colas contain phosphorus, and large amounts of caffeine, which has diuretic properties and causes the body to increase urination. The phosphorus binds with calcium, magnesium and zinc, and as the diuretic properties of the cola begin to take effect, the kidneys excrete these minerals to maintain body pH.

Aspartame acts to deplete magnesium, so drinking diet colas and sodas can cause magnesium deficiencies (and aspartame is also found in other foods).

Magnesium and enzymes

Virtually all biochemical reactions in the body require an enzyme to help the reactions take place. Enzymes are the basis of the body's ability to function while supplying life. But enzymes do not function alone and magnesium is a critical co-factor in more than 300 enzymatic reactions in the human body.

Acidity and alkalinity: the pH of the body

Our bodies require a tightly controlled pH balance, which is determined by the foods we eat.

Colas and sodas are the most acidic beverages you can buy, ranging in pH from 2.5-4.2. When the diet consists of acidic foods and beverages the body experiences acidosis (overly acidic body).

Left: Kale, cabbages and silverbeet growing at Flanshaw Road School, Te Atatu South: leafy green vegetables are good sources of magnesium



An acidic (low) pH greatly disrupts the body's mineral balance of the three dominant alkaline minerals: calcium, sodium and magnesium. The kidneys coordinate the efforts to buffer (neutralise) the acidity. Bones release calcium and magnesium, and muscles are broken down to produce ammonia, which is alkaline. Broken-down bones and muscles get excreted in urine.

Lack of oxygen

When the body is acidic there is a significant decrease in oxygen in the body. Without adequate oxygenation, unfriendly bacteria and viruses thrive and our cells cannot carry out their life-giving function. Metabolism slows, the body has trouble digesting food and, like an anaerobic compost heap, fermentation takes place.

Many scientists now believe that it is not germs that cause disease but the over-acidification of the body caused by mineral imbalances and deficiencies. Acidic blood is the precursor to almost every disease.

Electrolytes: electrically charged mineral salts

The main electrically charged mineral salts that make up the body's electrolytes are: sodium (Na^+), potassium (K^+), chloride (Cl^-), calcium (Ca^{2+}), magnesium (Mg^{2+}), hydrogen carbonate (bicarbonate, HCO_3^-), hydrogen phosphate (HPO_4^{2-}), and sulfate (SO_4^{2-}). Magnesium is especially important as it helps to regulate the level of other minerals such as calcium and potassium. Hypomagnesemia is a type of electrolyte imbalance usually the result of malnutrition.

Mineral salts maintain balance within the body so our muscles can contract and relax normally, oxygen is delivered to cells and carbon dioxide is removed, nerve messages are conducted properly, blood pressure levels are within a normal range, acid and alkaline levels are regulated, and fluid balance is maintained so we don't become dehydrated or over hydrated.

Electrolytes are important because cells use them to regulate nerve, heart and

muscle function. They help to electrically conduct or send messages within the muscle tissue, nerve tissue and fluid in and around body cells.

Mineral salts in food and drinks are, once digested, separated out and dissolved to form the electrolytes in your blood, urine and the fluid in and around your body cells. The kidneys work to keep electrolyte concentrations in the blood constant despite changes in your body. For example, during prolonged exercise, electrolytes (particularly sodium and potassium) are lost in sweat. These electrolytes must be replaced to keep the electrolyte concentrations of the body fluids constant, or severe cramp and dehydration are experienced.

Mineral-depleted soils and foods

Today our diet and our soils have changed dramatically. Industrialised farming methods employ large amounts of chemical fertilisers that encourage rapid plant growth, but return few of the vital minerals removed from the soil by growing plants. When the mineral content of soils declines, so does the nutritional value of crops grown in monocultures. Soil fertility is further reduced by the use of pesticides, fungicides and herbicides. All this adds up to modern processed foods that don't contain magnesium. Fluoridated water means that magnesium is unavailable for our bodies.

Many people eat the same monotonous diet of processed foods day in and day out, which also severely limits nutrient intake. Too often choices are based on flavours delivered by additives, not on the body's need for nutrients. This diet is composed of a steady stream of wheat and dairy products, meat and poultry, and a dearth of fresh organic fruits, vegetables, seeds and nuts. Wash all this down with sodas, colas and liquor – which will never replace the water needed to carry out virtually every function of the human body – and you have a total imbalance of magnesium and a diet for disaster.

The need for nutritional literacy

Had nutritional literacy been part of her

Magnesium in plants

Magnesium is part of chlorophyll and is essential for photosynthesis. It helps activate plant enzymes needed for growth. Magnesium is the carrier of phosphorus in the plant. It is required for the formation of plant oils, sugar synthesis and nutrient uptake and control. It also aids in the fixation of nitrogen in legume nodules.

Research suggests that we evolved along with plants on a diet high in magnesium such as leafy greens, nuts, seeds and unrefined whole grains, which meant that our bodies did not develop mechanisms for storing magnesium.

Best sources of magnesium

Foods high in magnesium include:

- pumpkin and sesame seeds
- nuts like almonds and Brazils
- whole brown rice, quinoa, buckwheat, oats
- avocados
- green leafy vegetables like spinach and broccoli because of their chlorophyll content.

Health effects of low magnesium

Low levels of magnesium can lead to anxiety, restless leg syndrome, sleep disorders, irritability, abnormal heart rhythms, low blood pressure, confusion, muscle spasm, seizures, and nervous disorders.

education, Natasha Harris would have known about the importance of maintaining a body pH of 7.4, and that extremely acidic substances like sodas leach minerals from the bones and organs. Nutritional literacy would have introduced her to electrolytes, and enzymes and the role of magnesium in keeping us alive.

So it should come as no surprise, if you examine the lack of food literacy that goes hand in hand with the industrialisation of food that Natasha was on the fast track to drinking herself to death. 

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