The importance of minerals

If we extracted all the minerals out of a human body, they would weigh about 9-11 kg. While we need only small amounts of minerals in our diet, they perform critical function for example; building bones and teeth, regulating heartbeat, transporting oxygen from the lungs to tissues etc.

Food storage or preparation does not destroy minerals. However, those minerals that are water soluble will leach into cooking water and be lost. Like vitamins, minerals can be toxic when consumed in excessive amounts and may interfere with the absorption and metabolism of other minerals.

The importance of minerals to the body

Calcium is an important structural mineral and 90% of that absorbed from the diet goes straight into the bones and teeth giving rigidity to the structure, The other 10% plays a crucial role in blood clotting, muscle contraction (including the heart), nerve conduction, the smooth functioning of the immune system and the production of energy it also partakes in RNA and DNA structuring and proper cell membrane permeability. Calcium is absorbed in the small intestine, a process that is dependent on the presence of vitamin D. Lack of calcium at any age in life means that bone stores are raided, greatly increasing the risk of osteoporosis in the future. Good intakes of calcium are therefore vital throughout life, especially during childhood and adolescence when bones are still developing, and in later years when bones are naturally starting to thin down.

Phosphorus is an essential mineral of which 90% of the body's stores are found in the bones and teeth where it forms part of an important structural salt, calcium phosphate. The remaining 10% of the body's stores serves a number of functions. Phosphorus is involved in the release of energy from fat, protein and carbohydrates during metabolism, and in the formation of DNA. It plays a role in the contraction of the heart muscles, overall functioning of the kidneys and utilisation of vitamins.It is a co-factor for several metabolic enzymes and plays an important role in balancing the body's production of acids and alkalis. As phosphate is so important for producing energy in the body, it is needed for optimum athletic performance.

Studies suggest that sodium phosphate supplements can increase maximal power output by up to 17%

Sodium is the main positively charged electrolyte found in the extra cellular fluids bathing all body cells. A pump in the cell membrane maintains high levels of sodium inside cells to offset that in the extra cellular fluid maintaining water balance and acid-alkali balance. (Preventing dehydration) Sodium also helps nerve functioning, it helps in muscle contraction, including heart muscle; it is used in energy production and also helps move nutrients into cells.

A lack of sodium in the body can induce dizziness, heat exhaustion, low blood pressure, rapid pulse, and mental apathy, loss of appetite, muscle cramps, nausea, vomiting, reduced body weight and headaches. It is not necessary to take sodium in the form of a supplement as it is already plentiful in food; in fact too many processed foods in your diet and insufficient water intake can increase your sodium intake leading to the possibility of oedema, high blood pressure and kidney disease. Some experts estimate that as many as 20% of elderly people who take diuretics may be deficient in sodium.

Magnesium is the fourth most common metal found in the body with approx 60% found in the bones and teeth. Magnesium maintains the body's proper PH balance. It is responsible for the function of over 300 enzymes, and is vital for every major metabolic reaction from the synthesis of protein to the production of energy from glucose. Few enzymes can work without it and magnesium is now known to help maintain healthy tissues especially those in the muscles which help the muscles to relax (especially important forPMT), heart muscles lung airways, blood vessels and nervous system. One of the most important functions for magnesium is to maintain the integrity of ion pumps that control the flow of sodium, potassium,

calcium, chloride and other salt components across cell membranes. By moving ions against gradients, these pumps allow cells to hold an electrical charge and, in the case of nerve cells, to pass electrical messages from one neurone to another. Magnesium is essential for maintaining a cell's electrical stability and is especially important in controlling calcium entry into the heart cells to trigger a regular heartbeat.

Lack of magnesium is common and may affect as many as one in ten people. Symptoms that may be due to magnesium deficiency include loss of appetite, nausea, fatigue, insomnia or nervousness weakness, muscle trembling or cramps, numbness and tingling, loss of co-ordination, palpitations, hyperactivity constipation, fits or convulsions, depression, confusion, high blood pressure and calcium deposited in soft tissue e.g. kidney stones.

Potassium is the main positively charged ion found inside cells, where it is present in concentrations 30 times greater than those in the extra cellular fluid surrounding each cell. It is actively pumped inside cells by ion-exchanging pumps found in cell walls, and in exchange, sodium ions are pumped out to make room for it. It enables nutrients to move into and waste products to move out of cells. Potassium is essential for muscle contraction (including the heartbeat) nerve conduction, maintenance of blood sugar levels - helps secretion of insulin for blood sugar control to produce constant energy, the production of nucleic acids, proteins and energy, stimulates gut movements to encourage proper elimination. The kidney regulates blood potassium levels and keeps them within a fairly narrow range.

Symptoms that may be due to lack of potassium include poor appetite, fatigue, muscle weakness, nausea, low blood glucose, muscle cramp, irregular or rapid heart beat, diarrhoea, constipation, swollen abdomen, cellulite, low blood pressure, resulting from an imbalance of potassium: sodium ratio, irritability, pins and needles, drowsiness, confusion and mental apathy.

Iron is an essential mineral needed for the production of haemoglobin, the red blood pigment which transports oxygen and the waste gas, carbon dioxide to and from the cells. Many enzyme systems also rely on iron to function properly, including those involved in the production of energy from carbohydrate, fat and protein. Iron is found in a protein, myoglobin, which binds oxygen in muscle cells for ready access during exercise, but two thirds of your body's iron stores are present in haemoglobin. Lack of iron quickly leads to the production of red blood cells that are much smaller and paler (due to lack of haemoglobin) than normal. This results in iron-deficiency anaemia with symptoms of paleness, fast pulse, listlessness, tiredness, exhaustion, dizziness, loss of appetite, nausea headache, sore tongue, sensitivity to cold and even shortness of breath and angina if anaemia is severe. Lack of iron also impairs concentration and learning ability especially for school children. Worldwide, iron deficiency is the most common nutritional disease. Iron plays an important role in immunity as white blood cells use powerful iron-containing chemicals to destroy invading micro organisms (bacteria, yeasts, viruses) and one of the signs of iron deficiency is often increased susceptibility to infection, especially recurrent thrush and herpes simplex virus attacks. As this can occur when levels of iron are not low enough to cause anaemia, it will not be picked up with a simple test to measure haemoglobin levels. Instead, it is necessary to measure the amount of iron-binding protein (ferritin) present in the circulation to detect low iron stores. Lack of iron can also trigger pica-a condition characterised by cravings for eating strange things such as soil, coal, paper. This is especially common during pregnancy.