

# C

## hapter 9

## Minerals

### Control Agents

**M**inerals are an **essential** group of nutrients that act in the body as **control agents**. They are significant in **energy production, cell reproduction and body maintenance**.

The role that minerals play in our metabolism is varied, yet, vital. Minerals are essential for structuring iron's relationship to the blood cells, cobalt's relationship to B12, and sodium and potassium controlling body fluids.

Minerals are categorized into **two groups**: The **major minerals** which are present in large amounts, and **trace minerals** which are present in smaller amounts.



### Major Minerals

#### Calcium

Calcium is present in the human body in the **largest amount**. An adult of approximately 150 lbs. has three pounds of calcium in his or her body. The quantity of calcium consumed and amount that is **actually utilized** by the body varies depending on a number of factors controlling absorption and utilization.

#### Physiological functions of calcium:

- ◆ Bone and teeth formation;
- ◆ Blood clotting;
- ◆ Helps contract and relax muscles;
- ◆ Normal nerve impulse transmission;
- ◆ Cell wall permeability — regulates fluid passage;
- ◆ Helps transport nerve impulses;
- ◆ Major factors in regulation of heart muscle.

Food sources of calcium are: ***dairy products, green leafy vegetables, nuts, and whole grains.***

## Phosphorus

The same factors that control calcium absorption in the body also determine the quantity of phosphorus absorbed. Phosphorus is **closely related to calcium** in many functions, but is found in the body in a **smaller quantity** (approximately 1 1/2 lbs. in a 150 Lb. man).

### Physiologic function of Phosphorus:

- ◆ Absorption of glucose;
- ◆ Transport of fat;
- ◆ Helps maintain pH of blood;
- ◆ Essential for energy metabolism;
- ◆ Strong bones and teeth.

## Sodium

Sodium is a crucially important mineral. It has numerous metabolic roles in the body. It is a major **electrolyte** in the extra-cellular fluids and helps **regulate the body fluids**.

### Physiologic functions of sodium:

- ◆ Regulates the acid-base balance through a buffer system;
- ◆ Controls the sodium pump in cell walls, allowing a cell wall to become permeable to potassium and other materials;
- ◆ Helps transmit electrochemical impulses to help stimulate muscle action;
- ◆ Deficiency may cause stomach and intestinal gas.

Excessive sodium intake can cause **edema** (a fluid accumulation). Sodium requirements are normally met by the body from our diet. Added sodium is rarely needed. Sources include: *milk, eggs, carrots, leafy green vegetables* and a *large percentage of processed foods*.

## Potassium

Similar to sodium, potassium is an element **associated with water balance**. Potassium is approximately **twice as plentiful as sodium**. The majority is located

**inside the body cells.** Potassium is absorbed from the **small intestines** and almost **all dietary potassium is absorbed.**

**Major physiologic functions:**

- ◆ Water and acid-base balance;
- ◆ Regulates the neuromuscular stimulation; normalizes heart beat;
- ◆ Aids in CHO metabolism and protein synthesis;
- ◆ Joins with phosphorus to send oxygen to the brain;
- ◆ Stimulates kidneys to dispose of body wastes;
- ◆ A deficiency may cause constipation, insomnia, slow and irregular heart beat;
- ◆ Diuretic drugs may have a tendency to deplete the body stores of potassium and a supplement may be needed.

## Trace Minerals

### Magnesium

Approximately **70% of all magnesium** in the body is **combined with calcium and phosphorus in the bone.** The remaining **30%** is in **soft tissue and body fluids.** It functions as an **enzyme activator** in **energy production and tissue protein synthesis.**

**Physiologic functions:**

- ◆ Plays an important role as a coenzyme in the building of protein;
- ◆ Helps keep you calm and cool - relaxes nervousness;
- ◆ Deficiency may lead to renal calculi.

### Chloride

Chloride is a constituent of body fluids outside the cells. It helps **control water balance** with **sodium.** It also assists in acid-base balance.

### Sulfur

Sulfur is an essential constituent of cell protein. It also is an active component in energy metabolism.

## Iron

Iron plays a vital role in our bodies, especially in the area of **blood-building** and **energy production**. The body levels are controlled by the dietary amounts consumed and the amounts in the liver that are constantly being used in the production of **hemoglobin**. Iron is absorbed by the **intestines with the aid of special cells** which receive the iron and transport them in the body.

### Factors affecting the absorption of iron:

- ◆ Body demands;
- ◆ Vitamin C aids by helping to change dietary iron to a usable form;
- ◆ HCL helps prepare iron for absorption;
- ◆ Adequate calcium as binding agent and to remove phosphate which hampers absorption.

### Physiologic functions:

- ◆ Hemoglobin formation. Hemoglobin is the oxygen transport carrier;
- ◆ Helps convert glucose to produce energy;
- ◆ Deficiency may cause a variety of anemias;
- ◆ Iron-weak persons may have poor memory due to brain being starved for oxygen.

## Iodine

Associated mainly with the **thyroid gland**, only a small amount is needed. The body's needs are adequately supplied by the use of **iodized salt**. It is **absorbed in the small intestines** and transported around the body with the *assistance of proteins*.

Approximately **one-third of all iodine** absorbed is **utilized by the thyroid gland**, the balance being excreted in the urine.

### Physiologic functions of iodine:

- ◆ Synthesis of thyroid hormone;
- ◆ Deficiency causes slow mental reactions;
- ◆ Needed to utilize fat;
- ◆ Shortage may cause rapid pulse, tremors, nervousness, increased irritation.

## Fluorine

Associated with the prevention of dental decay.

## Lithium

Very successful in treating manic-depressives and other mental illnesses.

## Copper

Copper is essential for **hemoglobin synthesis**, probably by promoting the absorption, mobilization and utilization of iron.

## Manganese

- ◆ Works with B-complex vitamins to overcome sterility;
- ◆ Combines with phosphatase (an enzyme) to build strong bones;
- ◆ Can biologically substitute for iron in heme molecule;
- ◆ Is deficient in chronic alcoholism;
- ◆ Promotes lactation.

## Selenium

Selenium can substitute for Vitamin E in certain animal species. Selenium is a **natural antioxidant**. It works closely with vitamin E in some of its metabolic actions and in the promotion of normal body growth and fertility.

## Zinc

- ◆ Constituent of insulin and of male productive fluid;
- ◆ Combines with phosphorus to aid in respiration;
- ◆ Helps the food become absorbed through intestinal wall;
- ◆ Essential to nucleic acid metabolism and protein synthesis;
- ◆ Deficiency may be a factor in atherosclerosis;
- ◆ Women who take oral contraceptives are usually zinc deficient.

## Molybdenum

- ◆ Possible role in iron utilization;
- ◆ Deficiency may result in renal calculi.

## Chromium

### Physiologic functions:

- ◆ Necessary for normal glucose utilization;
- ◆ Deficiency may be related to increased incidence of diabetes in later life;
- ◆ Is usually deficient in pregnancies and malnutrition;
- ◆ Deficiency may be caused by an excess of white sugar.

## Cobalt

### Physiologic functions:

- ◆ Constituent of vitamin B12;
- ◆ Related to healthy hemoglobin formation.

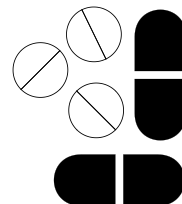
## Boron

Boron is an essential trace mineral believed to be related to vitamin C activity.

# Chelated Minerals

The word "**chelate**" is derived from the Greek word "chele" which means **claw**. Originally, it referred to the clamping down of a crab's claw. Its relationship to chelated minerals refers to the action of one or more **amino acids** (proteins) attaching itself and completely **surrounding a mineral**. A **new complex** has now been formed in this protective coating. The quality of this coating varies from product to product, and that old saying "*you get what you pay for*" is true.

When ingesting a tablet or capsule of a commercially prepared chelated mineral product, the initial environment is **stomach acid**. In this acidic medium many of the less expensive, poor quality tablets



tend to fall apart completely. This causes the protective chelate coating to be *destroyed* and the mineral to be **prematurely released and possibly destroyed**.

The HCL (Hydrochloric acid) medium in the stomach *disintegrates* a **capsule** in about *two minutes*. A tablet takes about fifteen minutes. In that time, the **chelate coating** is broken away and **ionizes** the mineral *allowing it to go free*. The mineral may then react with anything in the vicinity and not reach the small intestines. Therefore, it can't be properly absorbed and utilized.

It is therefore essential to purchase mineral supplements that have been chelated with a **pH sensitive amino acid coating of milk solids** and *not* amino acids from **vegetable proteins** (which tend to break down faster) to protect them.

A high percentage of mineral supplements when ingested may not provide the actual amount of that product you are expecting to obtain because of this problem. Before chelated minerals were sold, larger doses of minerals were prescribed to offset the percentage of destruction that occurred before the body had a chance to utilize the mineral.