



Minerals and the Body

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Janice R. Hermann, Ph.D., RD/LD

Nutrition Specialist

Many people think minerals and vitamins are the same, but they are not. Minerals, like vitamins, are important nutrients found in foods. The main difference is that vitamins are organic substances (meaning that they contain the element carbon) and minerals are inorganic substances. Minerals are needed for many things in addition to eating them in the form of nutrients in foods. The iron and copper in cookware or tools are the same minerals found in food. That is why cooking in a cast iron skillet can provide iron in the diet. When cooking food in an iron skillet, a little bit of the iron comes off and mixes with the food. People can absorb and use it just like iron that is already in food. Minerals are the most permanent part of living things. They do not burn, and in fact, they can be found in the ashes of something that has burned.

Major and Trace Minerals

There are two groups of minerals, major minerals and trace minerals. Major minerals are needed in the diet in amounts of 100 milligrams (mg) or more each day. A milligram is a very small amount. It is one thousandth of a gram, and there are 28 grams in an ounce. The major minerals are calcium, phosphorus, magnesium, sulfur, potassium, sodium and chloride. We need the trace minerals in smaller amounts (less than 100 mg each day). Some trace minerals are iron, iodine, zinc, fluoride, selenium, copper, chromium, manganese and molybdenum.

Uses of Minerals

The body contains many different minerals. Minerals by themselves are inactive chemical elements, like the iron in a pan or calcium in a rock. But in the body, calcium is used to make the bones and teeth and iron is used to make the hemoglobin in red blood cells. The body uses this iron to carry oxygen to its cells. Additional minerals help in many other body processes:

- Minerals become part of tissue structure, like in bone and teeth.
- Minerals help maintain acid-base balance, to keep the body pH neutral.
- Minerals help regulate body processes, such as in enzyme systems.
- Minerals function in nerve impulse transmission and muscle contraction.
- Minerals help release energy from food.

Electrolytes

Sodium, potassium and chloride are minerals that are called "electrolytes." In the body, they work to maintain water balance and provide the correct pressure between cells and their surrounding fluids. Sodium and chloride are the major electrolytes in the fluid that surrounds body cells. Potassium is the primary electrolyte within body cells. Table salt is the most common food

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that contains both chloride and sodium. Most people consume more than enough sodium. In fact, many health experts believe that consuming too much sodium from salt and a high salt intake may contribute to high blood pressure in people who are "sodium sensitive."

Mineral Toxicity

Minerals can build up in the body and they can be toxic and cause harmful effects. To avoid this possibility, never take individual mineral supplements unless your doctor prescribes them. Also, make sure to keep supplements that contain minerals in a safe place so children cannot accidentally eat them. A young child can get iron toxicity from taking several adult iron supplements at one time.

Minerals and the USDA MyPlate Food Groups

Minerals are present in foods in different amounts and all foods do not contain the same minerals. This is why people need to eat a variety of foods from all of the USDA MyPlate food groups. The Table 1 shows which minerals are found in the different USDA MyPlate food groups.

Table 1. Minerals Supplied by the USDA Daily Food Plan Food Groups.

| Food Group | Minerals Supplied |
|---------------|---|
| Dairy | Calcium, magnesium, phosphorus and potassium |
| Protein Foods | Iron, copper, zinc, chromium, magnesium, potassium, phosphorus and sulfur |
| Fruit | Magnesium, manganese and potassium |
| Vegetable | Potassium, magnesium, iodine and selenium |
| Grain | Iron, copper, zinc, manganese, magnesium, molybdenum, chromium and phosphorus |

As Table 1 shows, a variety of foods from each of the USDA MyPlate food groups is required to provide the minerals needed. The following table will help provide information on the function and best sources of minerals.

References

Whitney, E.N. & Rolfes, S.R. (2015). *Understanding Nutrition*, 14th ed., Wadsworth, Cengage Learning, Belmont, CA.

Brown, J.E. (2014) *Nutrition through the Life Cycle*, 5th ed., Cengage Learning, Stamford, CT.
United States Department of Agriculture. ChooseMyPlate.gov. Accessed www.choosemyplate.gov

Table 2. Minerals: Sources and Functions

| Mineral | Function | Food Sources |
|---------------------------------------|--|--|
| Summary of Major Minerals | | |
| Calcium (Ca) | Aids in formation of bones and teeth, normal blood clotting, muscle contraction and relaxation, heart function and nerve function | Milk and other dairy products, greens, broccoli, salmon, sardines, beans, peas and lentils. |
| Phosphorus (P) | Aids in formation of bones and teeth. Regulates release and use of body energy. Helps carry fat in the body as a part of phospholipids. Helps maintain normal acid/base balance in the body. | Meat, fish, poultry, eggs, milk, cereal products. |
| Magnesium (Mg) | Necessary for muscle contraction and nerve function. | Meat, seafood; nuts; beans, peas and lentils; dairy products; whole grains. |
| Sodium (Na) | Important component of body fluids, mostly outside cells. | Table salt, meat, seafood, milk, cheese, eggs, baking soda, baking powder, bread, vegetables, processed foods. |
| Potassium (K) | Important component of body fluids, mostly inside cells. | Potatoes, melons, citrus fruit, banana and most fruits and vegetables, meat, milk and beans, peas and lentils. |
| Summary of Some Trace Minerals | | |
| Iron (Fe) | Found in hemoglobin in red blood cells and myoglobin in muscle cells. Needed to carry oxygen. | Liver, meats, egg yolks, nuts, enriched or whole grains, beans, peas and lentils. |
| Iodine (I) | Part of thyroid hormones (thyroxin and triiodothyronine). | Seafood, iodized salt. |
| Selenium (Se) | Acts as an antioxidant. | Grains, meat, poultry, fish, dairy products. |
| Zinc (Zn) | Part of important enzyme systems Found in the hormone insulin. | Meat, seafood, whole grains. |
| Chromium (Cr) | Helps body use insulin. | Liver, brewer's yeast, whole grains, nuts, cheeses. |
| Copper (Cu) | Part of many enzymes. | Beans, peas and lentils; grains; nuts; seeds; organ meat. |
| Fluoride (F) | Part of teeth and bone. Helps prevent cavities in teeth. | Fluoridated drinking water, fish, tea. |

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