UNIVERSITY of MARYLAND MEDICAL CENTER

Manganese

Overview

Manganese is a trace mineral that is present in tiny amounts in the body. It is found mostly in bones, the liver, kidneys, and pancreas. Manganese helps the body form connective tissue, bones, blood clotting factors, and sex hormones. It also plays a role in fat and carbohydrate metabolism, calcium absorption, and blood sugar regulation. Manganese is also necessary for normal brain and nerve function.

Manganese is a component of the antioxidant enzyme superoxide dismutase (SOD), which helps fight free radicals. Free radicals occur naturally in the body but can damage cell membranes and DNA. They may play a role in aging, as well as the development of a number of health conditions, including heart disease and cancer. Antioxidants, such as SOD, can help neutralize free radicals and reduce or even help prevent some of the damage they cause.

Low levels of manganese in the body can contribute to infertility, bone malformation, weakness, and seizures. It is fairly easy to get enough manganese in your diet -- this nutrient is found in whole grains, nuts, and seeds -- but some experts estimate that as many as 37% of Americans do not get the recommended dietary intake (RDI) of manganese in their diet. The American diet tends to contain more refined grains than whole grains, and refined grains only provide half the amount of manganese as whole grains.

However, too much manganese in the diet could lead to high levels of manganese in the body tissues. Abnormal concentrations of manganese in the brain, especially in the basal ganglia, are associated with neurological disorders similar to Parkinson's disease. Early life manganese exposure at high levels, or low levels, may impact neurodevelopment. Elevated manganese is also associated with poor cognitive performance in school children.

Uses

Manganese may help some of the following conditions:

Osteoporosis

Manganese is one of several trace elements (including vanadium and boron) that are necessary for bone health. There is no specific evidence that manganese can prevent osteoporosis, but one study found that taking a combination of calcium, zinc, copper, and manganese helped lessen spinal bone loss in a group of post menopausal women. Anyone can develop osteoporosis, but it is common in older women. As many as half of all women and a quarter of men older than 50 will break a bone due to osteoporosis.

Arthritis

People with arthritis tend to have low levels of SOD (an antioxidant that helps protect the joints from damage during inflammation). Some experts theorize that manganese may increase SOD levels, but there is no proof that it helps treat arthritis. A few clinical studies of people with rheumatoid and osteoarthritis suggest that manganese taken along with glucosamine and chondroitin can reduce pain. However, some studies have found no effect. Other studies have found that women with fibromyalgia have lower levels of calcium, magnesium, iron, and manganese in their hair fibers than women without the disease.

Premenstrual syndrome (PMS)

In one well-designed clinical study, women who ate 5.6 mg of manganese in their diets each day had fewer mood swings and cramps compared to those who ate only 1 mg of manganese. These results suggest that a manganese-rich diet may help reduce symptoms of PMS. Another clinical study found that patients with PMS had significantly lower amounts of calcium, chromium, copper, and manganese in their blood than those without PMS.

Diabetes

Some studies seem to show that people with diabetes have low levels of manganese in their blood. But researchers don't know if having diabetes causes levels to drop, or whether low levels of manganese contribute to developing diabetes. More studies are needed. One clinical study found that people with diabetes who had higher blood levels of manganese were more protected from LDL or "bad" cholesterol than those with lower levels of manganese.

Epilepsy

Several clinical studies suggest that people who have seizure disorders have lower levels of manganese in their blood. But researchers don't know if having seizures causes low levels of manganese, or whether low levels of manganese contribute to having seizures. At least one animal study suggests that manganese supplementation does not reduce the severity or frequency of seizures in rats. More clinical studies are needed.

Dietary Sources

Rich dietary sources of manganese include nuts and seeds, wheat germ and whole grains (including unrefined cereals, buckwheat, bulgur wheat, and oats), legumes, and pineapples.

Available Forms

Manganese is available in a wide variety of forms, including manganese salts (sulfate and gluconate) and manganese chelates (aspartate, picolinate, fumarate, malate, succinate, citrate, and amino acid chelate). Manganese supplements can be taken as tablets or capsules, usually along with other vitamins and minerals in the form of a multivitamin.

How to Take It

The daily Adequate Intake (AI) for manganese is listed below.

Supplements and dietary intake of manganese together should not exceed 10 milligrams per day because of the risk of nervous system side effects. You should only take manganese supplements under the supervision of your doctor; that is especially true for children.

Children and Infants

- Infants 0 - 6 months: 0.003 mg
- Infants 7 months - 1 year: 0.6 mg
- Children 1 - 3 years: 1.2 mg
- Children 4 - 8 years: 1.5 mg
- Males 9 - 13 years: 1.9 mg
- Males 14 - 18 years: 2.2 mg
- Females 9 - 18 years: 1.6 mg

Adult

- Males 19 years and older: 2.3 mg
- Females 19 years and older: 1.8 mg

- Pregnant women: 2 mg
- Breastfeeding women: 2.6 mg

Pregnant women and nursing mothers should avoid intakes of manganese above the upper limit of the AI, unless under a doctor's supervision.

Precautions

Because of the potential for side effects and interactions with medications, you should take dietary supplements only under the supervision of a knowledgeable health care provider. The amount of manganese ingested in 1 day (from foods or supplements) should not exceed 10 milligrams due to the potential for nervous system damage.

Calcium, phosphorous, and manganese work closely together in the body. For this reason, you may need more manganese if you are getting more calcium and phosphorus.

Manganese rarely causes side effects when taken orally. It can be toxic to people who regularly inhale manganese vapors, such as industrial workers in steel mills and mines, or people with liver damage, including alcoholic cirrhosis. Symptoms include loss of appetite, headaches, leg cramps, muscle rigidity, tremors, convulsions, extreme irritability, acts of violence, and hallucinations. Manganese toxicity has also been seen in people who received very high amounts of intravenous nutrition (containing manganese) over long periods of time.

Possible Interactions

If you are currently being treated with any of the following medications, you should not use manganese supplements without first talking to your health care provider.

Haloperidol and other antipsychotics -- There has been at least one clinical report of an interaction between haloperidol and manganese that resulted in hallucinations and behavioral changes in a person with liver disease. In addition, some experts believe that medications for schizophrenia and other forms of psychosis may worsen side effects from manganese supplements. If you take antipsychotic medications, do not take manganese without first talking to your doctor.

Reserpine -- Reserpine, a medication used to treat high blood pressure, may lower manganese levels in the body.

Antacids -- Magnesium-containing antacids may decrease the absorption of manganese if taken together. Take supplements containing manganese at least 1 hour before or 2 hours after taking antacids.

Laxatives -- Magnesium containing laxatives may decrease the absorption of manganese if taken together. Take supplements containing manganese at least 1 hour before or 2 hours after taking laxatives.

Tetracycline antibiotics -- These drugs may reduce the absorption of manganese if taken together. Take supplements containing manganese at least 1 hour before or 2 hours after taking these antibiotics. They include tetracycline, minocycline (Minocin), and demeclocycline (Declomycin).

Quinolone Antibiotics -- Manganese may inhibit the body's absorption of these medications.

Supporting Research

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Version Info

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