

## Minerals in the Diet and their Health Effects

Mineral (chemical abbreviation)	Major Food Sources	Main Health Effects	Notable Nutrition
<b>Calcium (Ca)</b>	Dairy products, sardines fortified non-dairy milks, tofu, cruciferous vegetables, leafy greens (e.g., spinach).	Bone and dental health; muscle activity; blood pressure and clotting.	There are plenty of dietary sources of calcium beyond dairy products, though there are many different kinds of calcium in foods, as well as supplements, and absorption in the body differs because of this and other factors. While important for bone health, along with vitamin D, many studies suggest that its role has been overstated.
<b>Chloride (Cl)</b>	Obtained through salty foods as part of sodium chloride; processed foods are major sources.	Assists in fluid balance and aids in digestion through its role in stomach acid.	Deficiencies are rare given the high intakes that come from processed foods.
<b>Chromium (Cr)</b>	Nuts, cheese, poultry, fish, red meat, yeast.	Key role in healthy blood glucose and insulin.	Found in many of the foods people regularly consume so intakes are generally adequate. Some studies have examined its role in type 2 diabetes, but evidence on supplementation as a prevention or treatment measure is weak.
<b>Copper (Cu)</b>	Whole grains, nuts and seeds, shellfish, prunes.	Assists in iron metabolism and red blood cell synthesis.	Required intakes are very low; deficiencies are extremely rare.
<b>Fluoride (F)</b>	Local fluoridated water supplies are the largest provider; some teas provide small amounts.	Dental and bone health.	While some towns choose not to fluoridate their water supply, decades of research have found that fluoridated water improves dental health by decreasing the prevalence of cavities. Excessive fluoride intakes can cause teeth mottling in children.
<b>Iodine (I)</b>	Table salt fortified with iodine; seafood.	Key player in thyroid hormone, important for many body functions (e.g., body	Salt is iodized in the US (and water and other foods elsewhere) to prevent deficiency, which can lead to goiters and/or severe brain damage. Many sea salts and

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		temperatures, reproduction, growth).	kosher salts are not iodized, but healthy adults consuming these salts often obtain adequate intakes through processed foods and seafood; sea salt also has some iodine naturally. Because of the limited food sources, goiters are endemic where foods are not fortified with iodine.
<b>Iron (Fe)</b>	Red meat, poultry, eggs (heme); fruits, green vegetables, fortified breads and cereals (non-heme).	Key player in transporting iron throughout the body; participates in synthesizing amino acids, collagen, neurotransmitters, and hormones.	There are two kinds of iron: heme, found in animal foods, and non-heme, found in plant foods. Non-heme iron is not as well absorbed as heme iron so those abstaining from meat should monitor blood iron levels as a part of regular physical exams. Pregnant and menstruating women have higher iron needs. Iron deficiency anemia is one of the major nutritional deficiencies in the world.
<b>Magnesium (Mg)</b>	Nuts and seeds, green vegetables, whole grains.	Key for glucose metabolism, muscle activity, blood pressure, and blood clotting; required for synthesis of DNA, RNA, and glutathione (an antioxidant).	Inadequate intakes have been associated with a higher risk of type 2 diabetes, cardiovascular disease, and osteoporosis, but more RCTs are needed. High intakes may be effective for migraine reduction (under clinical supervision).
<b>Manganese (Mn)</b>	Nuts, legumes, whole grains, tea.	Critical in bone health and also participates in energy metabolism.	Toxicity is rare, but those consuming many manganese-rich foods should ensure they aren't getting too much.
<b>Molybdenum (Mo)</b>	Legumes, nuts, grain products, milk.	Critical component of enzymes.	Deficiency is extremely rare.
<b>Phosphorous (P)</b>	Ubiquitous in food, including meat, dairy eggs, fish, poultry, and some vegetables and nuts like almonds; used as an additive in processed foods,	Critical role throughout the body, including gene expression, metabolism, bone health, and phospholipids.	Intakes are much higher than recommended in those consuming typical Western diets, and high consumption of phosphorous and phosphates (compounds that include phosphorous) has been related to impaired kidney function,

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	like soda pop.		higher risk of cardiovascular disease, and lower bone density that may increase risk of osteoporosis and fractures.
<b>Potassium (K)</b>	In many foods, including meat, dairy, and plant foods like fruits, vegetables, grains, and beans.	Together with sodium, a key element in cell signaling, including roles in fluid balance that regulate blood pressure, muscle contractions, and nerve impulses.	Alongside sodium, potassium is also related to healthy blood pressure and heart health.
<b>Selenium (Se)</b>	High in plant foods, depending on the soil content where they're grown; organ meats and seafood also have some.	Antioxidant (i.e., squelches single oxygen to prevent cell damage); helps regulate thyroid hormone activity.	Selenium has been associated with a lower risk of cancer in some studies but results are conflicting and more research is needed. High intakes can be harmful.
<b>Sodium (Na)</b>	Processed foods are by far the biggest contributor; table salt used on foods and in cooking is relatively negligible.	Key element in cell signaling, including roles in fluid balance that regulate blood pressure, muscle contractions, and nerve impulses.	High intakes increase blood pressure and hypertension, which are risk factors for heart disease, though salt sensitivity varies by individual.
<b>Sulfur (S)</b>	Meat, fish, poultry, nuts, beans.	Works together with protein to protect hair, nails, and skin.	Sulfur is part of the side chain of some amino acids as well as the B vitamin thiamin. Deficiency is extremely rare.
<b>Zinc (Zn)</b>	Meat, poultry, supplements.	Assists in synthesis of enzymes, proteins, and new cells; important for vitamin A activation; plays a role in immune function, vision, blood clotting, wound healing, and reproduction.	Evidence that zinc lozenges prevent or treat colds is weak. Pregnant and nursing women and children need more zinc than others, and zinc deficiency is common in the developing world, where children often suffer from cognitive and behavioral problems. Older adults and those with certain clinical conditions or taking some medications may have enhanced zinc needs.

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