~ Chapter 6 ~

More on Mighty Micronutrients: Where They're Found and Why They're So Mighty

Note: Micronutrients are best obtained from whole food sources, or from whole food supplements. Some need to be replenished daily, and some are needed only in trace amounts by the body. While it would be difficult to "overdose" on most micronutrients when derived from food, supplement intake should not exceed amounts recommended on the label. This is especially true for certain substances—vitamin A, for example—that can be toxic in unneeded quantities (even vitamin C, which can be taken in more liberal doses, can cause stomach distress when excessive amounts are ingested). So use caution and common sense when supplementing your dietary intake.

Calcium

Where it's found: Milk, yogurt, cheese and leafy green vegetables.

Why it's mighty: Calcium is a mineral that plays a number of essential roles in the body, including the maintenance of strong bones and teeth, helping blood vessels expand and contract and relaying nerve transmissions.

Chromium

Where it's found: Brewer's yeast, eggs, chicken, wheat germ, spinach, broccoli, apples, bananas, grape juice, green peppers, beef, liver. (Foods containing high levels of the sugars glucose and fructose may actually result in loss of chromium).

Why it's mighty: Though how it works is not completely understood, this essential mineral helps the body to metabolize insulin, fats and carbohydrates. It also helps promote the synthesis of cholesterol,

which plays a role in brain function, as well as other chemical processes.

Copper

Where it's found: Shellfish, nuts, beans, peanut butter, chocolate, mushrooms, whole grains, beans, potatoes, dark leafy greens and dried fruits.

Why it's mighty: This trace element is a key component of essential enzymes that play a number of important roles in the body, including the production of cellular energy, the formation of connective tissue and red blood cells, and helping the brain and nervous system to function properly.

Flavonoids

Where they're found: All kinds of fruits and vegetables, along with certain beverages, such as fruit juices, tea and coffee.

Why they're mighty: Flavonoids are natural chemical compounds with strong antioxidant properties that are also believed to offer protection against tumors, inflammation, allergens and viruses. Studies have linked flavonoid consumption to a lower risk of heart attacks.

Folate

Where it's found: Citrus fruits, dark green leafy vegetables, whole grains (especially wheat bran), beans and legumes, poultry, shellfish, liver.

Why it's mighty: A water-soluble B vitamin that needs to be constantly replenished, folate assists in red blood cell formation and tissue growth, and

helps the body manufacture DNA. It is also an especially essential micronutrient for pregnant women, as it reduces the risk of birth defects. A folate deficiency can result in anemia, whose symptoms include fatigue and shortness of breath. Folic acid is the form most commonly used in supplements.

Iodine

Where it's found: Iodized salt, fish and other seafood (including cod, haddock, perch and shrimp), seaweed (kelp), potatoes, milk, turkey breast.

Why it's mighty: Iodine is a trace mineral that's necessary for proper functioning of the thyroid, and it plays an intrinsic role in the body's ability to store and release thyroid hormones. It also assists in cell metabolism, which involves the conversion of food into energy. Iodine deficiency is considered the most common cause of preventable brain damage, especially in children.

Iron

Where it's found: Poultry, egg yolks, salmon, tuna, lean red meat, dried beans and fruits and shellfish. Legumes, almonds and Brazil nuts, dark green vegetables and whole grains are also good sources, though the iron from these may be more difficult to absorb. Vitamin C-rich foods, however, can help increase the body's ability to absorb iron, as can mixing plant sources with meat, fish or poultry.

Why it's mighty: Iron is an essential mineral that the body requires to manufacture hemoglobin,

the primary protein in red blood cells that transports oxygen from the lungs to other organs, and myoglobin, which stores oxygen in muscle cells.

Lutein

Where it's found: Carrots, tomatoes, squash, dark leafy greens (spinach, collard greens, kale), eggs, oranges or any fruits, berries or vegetables with orange, red and yellow pigments.

Why it's mighty: A member of the carotenoid family, this phytochemical helps keep vision sharp and reduces the risk of macular degeneration and cataracts. According to recent research done by the University of Southern California and University of California at Los Angeles, it may help prevent stroke by significantly reducing the thickness of carotid (neck) artery walls.

Manganese

Where it's found: Nuts, whole grains, dried legumes.

Why it's mighty: Although harmful if inhaled as dust, this mineral is quite important to the body when ingested in trace amounts as a micronutrient. Its functions include assisting the coordination among the brain, nerves and muscles, as well as serving as a component of various enzymes that metabolize proteins, fats and carbohydrates, helping in the formation of bones and the healing of wounds.

Magnesium

Where it's found: Dark green leafy vegetables, almonds and cashew nuts, seeds, legumes, soy

products, whole grains, avocados, bananas and other vegetables.

Why it's mighty: Magnesium helps the body perform a number of important functions, including synthesizing protein, regulating temperature and supporting enzyme functions and muscular contraction and relaxation.

Niacin (Vitamin B3)

Where it's found: Eggs, nuts, poultry, salmon, canned tuna, dairy products, lean meat.

Why it's mighty: Niacin helps convert food into energy and benefits the skin, nerves and digestive system. Another water-soluble vitamin, it needs to be constantly replenished.

Potassium

Where it's found: Bananas, prunes, citrus fruits, apricots, broccoli, tomatoes, lima beans, sweet potatoes, and many other fruits and vegetables, almonds, sunflower seeds, chicken, red meat and fish such as salmon, flounder, cod and sardines.

Why it's mighty: This essential mineral serves as an electrolyte, which means it plays an intrinsic role in the electrochemical balance of cells that must be maintained in order for them to function properly. Its functions include supporting normal growth and the development of muscle tissue, as well as the synthesis of protein from amino acids. Potassium deficiency, known as hypokalemia, can result in weakness, fatigue and abdominal problems, and in severe cases, muscle paralysis or cardiac arrhythmia.

Phosphorus

Where it's found: Dairy products, poultry, beef, fish (salmon, halibut) and eggs.

Why it's mighty: Phosphorus is an essential component of our bones and teeth and a key player in the body's production and storage of energy, as well as in the storage and transmission of genetic information. It also serves as a buffer, helping the body to maintain a normal acid-base balance, or pH, and in a number of other vital roles—including supporting the ability of red blood cells to deliver oxygen, helping to synthesize protein for the maintenance of cellular and tissue structure, supporting the functioning of muscles and kidneys and helping to regulate the heartbeat.

Vitamin B6

Where it's found: Eggs, nuts, beans, whole grains, meat, salmon, poultry, spinach.

Why it's mighty: Vitamin B6 plays a key role in the formation of red blood cells and in their ability to transport oxygen, and assists in the synthesis of neurotransmitters in the brain, such as serotonin. It also helps dozens of enzymes in the body to perform their various tasks (such as producing glucose from amino acids), supports the immune system's production of antibodies, and may act to reduce the risk of breast and prostate cancer.

Vitamin B6 is a water-soluble vitamin that can't be stored in the body, and which can be obtained only from dietary sources, since it is not internally synthesized.

Vitamin B12

Where it's found: Meat, poultry, eggs, shellfish and milk.

Why it's mighty: Vitamin B12, which is released from food in the digestive tract, helps support the central nervous system and assists in red blood-cell production. Unlike other water-soluble vitamins, it can be stored in the liver; however, certain conditions, such as pernicious anemia or the surgical removal of part of the intestine, can result in deficiencies. Also, strict vegetarians are not likely to get enough from dietary sources, and may well need to take a B12 supplement. Deficiencies can result in symptoms that range from numbness and tingling of the limbs to dementia.

Vitamin C (ascorbic acid)

Where it's found: Citrus fruits, green and red peppers, tomatoes, strawberries, broccoli, green leafy vegetables, cantaloupe, watermelon, blueberries, raspberries, Brussels sprouts, papayas, mangoes, potatoes (both sweet and white), and other fruits and vegetables.

Why it's mighty: Think of the "C" in Vitamin C as signifying its role as the body's chief antioxidant, or defender against oxidative stress, and you'll get an idea of how essential it is in keeping cells from being damaged by the actions of free radicals (byproducts of oxygen metabolism) that can lead to cancer, heart disease and problems such as arthritis. It is especially important in protecting brain cells from free-radical destruction. Vitamin C is also necessary in promoting tissue growth, the healing of wounds and the maintenance of bones, cartilage and

teeth, and in providing protection against the effects of pollutants. Studies have indicated that it helps protect against the risk of stroke and contributes to longevity.

Vitamin C deficiencies can result in such problems as gingivitis and bleeding gums, nosebleeds, anemia, swollen joints and rough, scaly skin. (While vitamin C, which is water soluble, needs to be replenished every day, supplementary amounts in excess of 2,000 mg a day can cause stomach irritation.)

Vitamin D

Where it's found: Fatty fish (salmon, sardines. mackerel), oysters and dairy products. Vitamin D is also absorbed through the skin directly from sunlight.

Why it's mighty: Vitamin D enables calcium to be absorbed and metabolized in the body, as well as helping to maintain the proper balance of calcium and phosphorous in the bloodstream. It is a fat-soluble vitamin that can be stored in the body.

Vitamin E

Where it's found: Wheat germ**,** nuts, sunflower seeds and green, leafy vegetables.

Why it's mighty: Another important antioxidant, this fat-soluble vitamin also protects cells against the effects of free radicals, as well as supporting the immune system and helping in the repair of DNA. Vitamin E works especially well in concert with Vitamin C.

Vitamin K

Where it's found: Cabbage, spinach and other green leafy vegetables, cauliflower, asparagus, broccoli, Brussels sprouts, watercress, green beans and peas, soybeans, whole wheat, oats. It is also manufactured by bacteria in the gut. Another form, Vitamin K2, which studies have shown can reduce the risk of prostate cancer, is found in natto, a fermented soybean food, and other fermented foods.

Why it's mighty: This fat-soluble vitamin is essential to the clotting of blood, and it may also help older people to maintain bone strength. It has also been shown to offer protection against various cancers and is used in some anti-cancer therapies. It may also help to prevent hardening of the arteries and Alzheimer's disease.

Riboflavin (Vitamin B2)

Where it's found: Eggs, nuts, spinach and other green leafy vegetables, broccoli, asparagus, legumes, milk and other dairy products, salmon and lean meats.

Why it's mighty: Working in conjunction with other B vitamins, riboflavin assists in the production of red blood cells and in converting carbohydrates into energy. Being water soluble, it needs to be replenished daily.

Selenium

Where it's found: Brazil nuts, pasta, canned tuna, cod, eggs, bread and meat as well as plants grown in selenium-rich soil, common to the Dakotas, Utah, Montana, Wyoming and Colorado.

Why it's mighty: Needed by the body only in small amounts, selenium is used to produce antioxidant enzymes called selenoproteins, which help prevent free-radical damage and are also believed to support immune-system and thyroid functions and glucose metabolism. Studies have indicated that selenium may be instrumental in reducing the risk of prostate, colorectal, lung and skin cancer, as well as rheumatoid arthritis. Research done in France has also indicated that selenium may offer protection against cognitive decline in elderly people.

Thiamin (Vitamin B1)

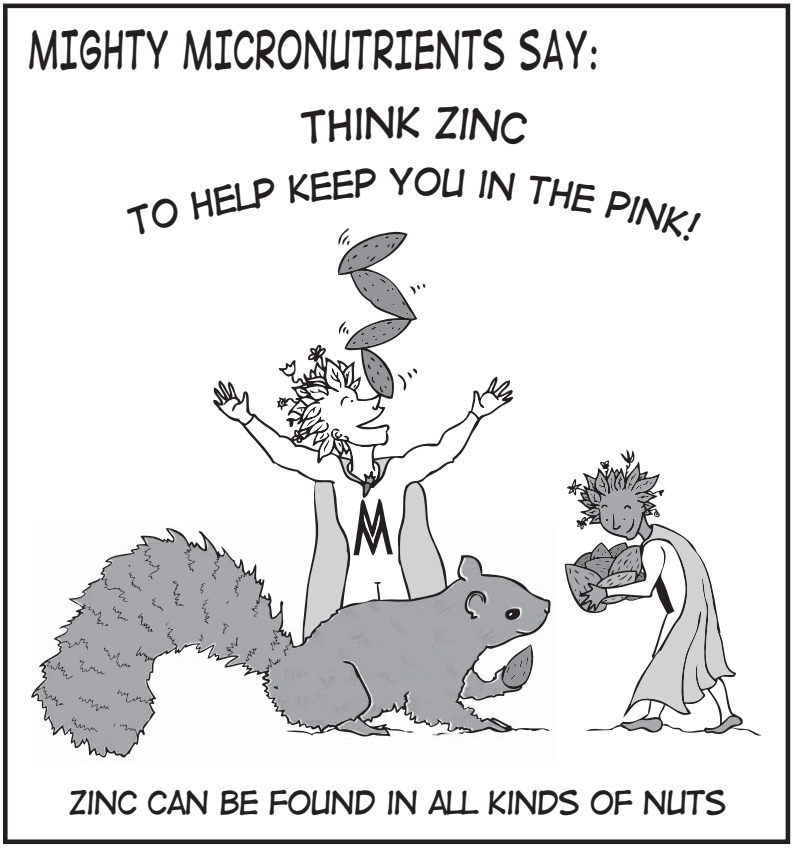
Where it's found: Pasta, wheat germ, whole grain cereals, nuts, soybeans, peas, beans and lentils, fish and lean meat.

Why it's mighty: Thiamin is an essential vitamin that supports the proper functioning of the nervous system, the heart and other muscles, and helps convert carbohydrates into energy. Severe thiamin deficiency (which may be caused by alcohol abuse) can result in the affliction known as beriberi, congestive heart failure and a form of dementia.

Zinc

Where it's found: Whole grains, nuts, seeds, poultry, meat and shellfish.

Why it's mighty: In addition to enhancing immunity and protecting against infection, zinc can help alleviate eczema, act as an appetite stimulant and improve one's ability to concentrate.



Sources for this information include the web sites of the Linus Pauling Institute at Oregon State University, Medline Plus (a service of the U.S. National Library of Medicine and the National Institutes of Health) and the Franklin Institute Resources for Science Learning.