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Iron

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Considering how much iron surrounds us (it's the fourth most abundant element on Earth) and how little we need in our bodies (less than a teaspoon), it's surprising that iron deficiency is the most common nutritional shortcoming both in the United States and worldwide.

Iron problems may hit infants, especially between the ages of six months and two years, if they're weaned from breast milk, which contains sufficient iron, to cow's milk, which doesn't. For them, iron-fortified formula and cereals are the solution.

Adults also need iron, and sometimes, we just plain come up short. A woman's iron needs are especially great. During her childbearing years, she needs one-and-a-half times as much iron as a man. Liver and red meat—both loaded with iron—are considered health foods in parts of the world where meat is scarce, and that's just what they are to tired women and irritable, listless babies. The form of iron found in meat is also more easily absorbed than iron from, say, vegetables or soy.

Men rarely become iron-deficient unless they've lost blood. Because getting too much can increase a man's risk for other conditions, doctors say that men should not take supplements unless a deficiency is diagnosed.

Show Me the Oxygen oxygen

It takes only about 30 seconds, maybe a minute at most, for us to realize how vital oxygen is to our well-being. Stop breathing, and in 10 minutes or so, you're dead. Every cell in our bodies requires oxygen to make the energy that keeps it going.

Iron delivers the oxygen. "It's kind of like the breeze that fans the flames," explains Janet Hunt, R.D., Ph.D., a researcher with the U.S. Department of Agriculture Human Nutrition Research Center in Grand Forks, North Dakota.

This mineral looms large in oxygen delivery because it's a vital part of hemoglobin, a protein that's found in red blood cells. Each hemoglobin molecule can carry four molecules of oxygen. A particular kind of iron, called heme iron, plays an integral role in this process of toting oxygen molecules from the lungs to other parts of the body. As red blood cells pass through the lungs, the heme iron, which is indirectly bound to the hemoglobin in a special way, readily picks up oxygen. Then, as the red blood cells pass through other tissues in the body, they release their oxygen freight wherever it's needed.

Iron Profile

Supplement forms: Ferrous gluconate, sulfate, and glycinate.

May help: Iron-deficiency anemia, heavy menstrual bleeding, and canker sores.

Daily Value: 18 milligrams.

Special instructions: For maximum absorption, take on an empty stomach unless indigestion occurs; then take with food. A meal containing 25 to 30 milligrams of vitamin C can enhance absorption by as much as 85 percent. Avoid using over-the-counter preparations such as enteric-coated tablets or capsules containing slow-release granules. Don't take iron and calcium supplements, prescription medications to reduce stomach acid, or antacids at the same time; and don't wash down your iron tablet with tea. All can significantly decrease absorption.

Who's at risk for deficiency: Children; teenagers, especially teenage girls; premenopausal women; pregnant women; and vegetarians.

Good food sources: Lean beef, dark chicken meat, shellfish, and iron-fortified cereal products.

Cautions and possible side effects: It's best not to take supplements unless you are a woman with heavy menstrual bleeding or have been diagnosed with low iron status or anemia. May cause constipation. For people with hemochromatosis, taking iron supplements can be dangerous.

Iron is also a crucial part of another protein, myoglobin, found in muscles, that picks up and stores additional oxygen for use when muscles have to go at it long and hard. When you're low on iron, your capacity for exercise is reduced because your myoglobin can't transport enough oxygen to the muscles for the long haul.

The Energy Hand-Off

True, oxygen is needed for a cell's energy production, but iron plays another vital role in the energy-producing process as part of a cell's energy "assembly line."
In a cell's power plant, called the mitochondria, a set of proteins, some containing iron, are lined up in a bucket brigade called the electron transport chain. "These proteins transfer electrons from energy-yielding nutrients to oxygen, forming water and carbon dioxide, and in the process of respiration make a molecule called ATP, a cell's basic energy currency," says Paul Saltman, Ph.D., professor of biology at the University of California at San Diego. "Without enough iron, a cell's capacity to produce energy drops way off."

Iron also helps to oxidize compounds. It takes away electrons, a process that generates free-roaming, unstable molecules called free radicals that damage cells. In a way, this puts iron in head-to-head competition with vitamin E, which is well-known as an antioxidant that helps neutralize free radicals and prevent electron pilfering. "One is not necessarily better than the other," Dr. Saltman says. In fact, both processes are necessary for life, and they tend to balance each other out.

Iron is found in many enzymes so it plays a role in the enzyme activity that affects your cells. And this mineral is in the production line that leads to the making of amino acids, hormones, and neurotransmitters. It's on-site when beta-carotene is converted to the active form of vitamin A. It plays a walk-on part in the production of collagen, one of the body's major structural proteins. In the liver and intestines, iron also does essential emergency work, converting harmful toxins into safer compounds that can be more easily excreted.

Fighting Microbes, Helping Enzymes

Given iron's role in energy production and protein synthesis, it only makes sense that a shortage may decrease our resistance to infection. "We fight off infection by building up our armies of immunity—our white blood cells—and that takes lots of energy and protein," Dr. Saltman explains. Iron helps produce both.

Strange Cravings? Check Your Iron

It's not unusual to have a hankering for chocolate brownies, ripe watermelon, or a nice, juicy steak. But what if it's laundry starch, glue, or Styrofoam cups that you find yourself snacking on?

Doctors have a word for this bizarre disorder. It's called pica, a name that comes from the same Latin root as magpie, a bird known for its indiscriminate appetite. Over the years, doctors have reported cases of people with pica eating many unpalatable items including dirt, chalk, clay, library paste, paint chips, paper, cardboard, ice chips, and Styrofoam.

In one case, a 22-year-old woman showed up in the emergency room with undigested pieces of tube socks in her stomach. She had begun chewing socks to relieve the stress of moving away from her family. Unfortunately, instead of moving right along, the remains of the socks wadded up in her stomach, forming a painful, indigestible ball.

"Pica is a strange mix of the physical—usually an iron deficiency—influenced by psychological and even social settings," says William H. Crosby, M.D., a retired hematologist in Joplin, Missouri, who has a long-standing interest in pica. The condition tends to occur in pregnant women, who are often low in iron, and in some babies. The babies affected tend to be "milkaholics," meaning that they drink milk to the exclusion of other foods, thus lowering their intake of iron. No one knows why iron deficiency would cause such strange behavior, but often, when the deficiency is corrected with iron supplements, eating habits return to normal, Dr. Crosby says. Even the woman with a taste for socks got back to normal with iron supplementation.

Sometimes, people who are iron-deficient compulsively chew ice or gum or eat crunchy, salty, or sour foods such as potato chips, pickles, or unripe fruit, Dr. Crosby says. The name for this is food pica, which is the most common type in the United States.

Rather than put up with this behavior, see a doctor to be tested for iron deficiency and to get supplemental iron if necessary, Dr. Crosby says. A common problem in food pica is that people are ashamed about compulsively eating ice or other unusual items. "Don't let shame stop you from seeking a diagnosis," he says. "A good doctor will realize that this disorder can have an easily treated physical cause." People with pica are often amazed at how easily their compulsive behavior stops once they begin treatment, he says.

Inside certain immune cells, iron plays an additional microbe-zapping role. Immune cells called macrophages, which can engulf and digest bacteria, rely on iron-containing enzymes. These enzymes are kept safely away from other parts of the cell inside special sacs. When they are released, they break down the bacteria that the macrophages engulf, Dr. Saltman says. "That whole system would be compromised in the case of iron deficiency."

Good for the Brain and Body

In addition to helping out macrophages, iron plays an important role in physical and mental functions. It is a crucial component of an enzyme, amine oxidase, that helps to produce three neurotransmitters, dopamine, serotonin, and norepinephrine. These brain chemicals are involved in dozens of different functions, including movement, intellectual performance, waking, sleeping, and emotional states like excitement, grief, happiness, and depression. No wonder iron deficiency has been strongly linked with changes in behavior and mood.

In adults, the symptoms are likely to be trouble concentrating, listlessness, and perhaps some irritability and trouble sleeping, Dr. Saltman says. Those problems get better when iron is restored.

Children who are iron-deficient may develop permanent problems. "There's growing evidence that children can have permanent brain damage if they are iron-deficient during critical times in brain development," Dr. Saltman says.

People with iron deficiency may have another problem as well—an impaired ability to maintain body temperature in a cold environment. In other words, they just can't get warm. "In this case, the lack of iron may be stopping the thyroid gland from functioning properly," Dr. Hunt says. It's because the thyroid controls the body's metabolism—its ability to burn calories for energy and for heat.

Your body must have iron on hand to be able to incorporate another essential nutrient, iodine, into molecules of thyroxine, the main thyroid hormone. Iodine activates thyroxine, letting it do its job of revving up your metabolism and letting you burn some calories as heat. No iron means no heat.

Coming Up Short?

Ask the Expert about Natural Vitamins (click)

Iron supplements used to be considered fairly safe for just about anyone, but now researchers have some reservations. High iron levels have been associated with a slightly increased risk of cancer and heart disease, probably because excess iron can cause cell damage. Plus, about 1 in every 300 people has an inherited disorder called hemochromatosis, which can cause a buildup of iron in your liver, spleen, heart, and other organs. This can be dangerous if you get lots of iron in your diet or from supplements, says James D. Cook. M.D., a hematologist and professor of medicine at the University of Kansas Medical Center in Kansas City. A blood test can reveal whether you have this condition.

Frequently, diets that are low in iron—like the diets of some vegetarians—are also low in copper, says Dr. Saltman. Be sure that there is some copper in your multivitamin/mineral supplement.

If you're a woman who is still menstruating, it's safe to take a daily supplement with up to 18 milligrams (the Daily Value) of iron, says Dr. Cook. If you think that you may be really short on iron, though, you should have your blood levels checked by a doctor. People who are consistently short on iron, as shown by blood tests, need to take much higher amounts initially to restore normal levels. After you reach a normal level, which is easily determined by a quick blood test, you may be able to slack off on supplementation after talking to your doctor. Anyone else—older women, men, children, and regular blood donors—should take supplemental iron only on a doctor's advice.

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