



Extension FactSheet

Human Nutrition, 1787 Neil Avenue, Columbus, OH 43210

Iron

This fact sheet is one in a series containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber. Following these guidelines will put your diet in accordance with the Dietary Guidelines for Americans, which focus on nine general topics:

- Adequate nutrients within calorie needs
- Weight management
- Physical activity
- Food groups to encourage: fruits and vegetables, whole grains, and nonfat or low-fat milk and milk products
- Fats
- Carbohydrates
- Sodium and potassium
- Alcoholic beverages
- Food safety

Why do we need iron?

Iron has been considered an essential mineral for our bodies for over a century. Iron, a mineral, functions primarily as a carrier of oxygen in the body, both as a part of hemoglobin in the blood and of myoglobin in the muscles. It also aids in immune function, cognitive development, temperature regulation, energy metabolism, and work performance. About 90% of the iron in our body is conserved and reused every day; the rest is excreted. Men are able to naturally store more iron than women. In order to maintain iron balance in the body for both men and women, dietary iron must supply enough iron to meet the 10% gap that our body has excreted or else deficiency will result.

What is “a good food source”?

A good food source of iron contains a substantial amount of iron in relation to its calorie content and contributes at least 10% of the U.S. Recommended Dietary Allowance (U.S. RDA) for iron in a selected serving size. The U.S.

RDA for iron is the amount of the mineral used as a standard in nutrition labeling of foods, which is 18 milligrams per day for iron. The current RDA for iron for postmenopausal women (ages 50+) and all men is 8 milligrams per day. The RDA for premenopausal women (ages 19 to 50) is 18 milligrams per day. The RDA for children (ages 4 to 8) is 10 milligrams per day. These recommendations are based upon the 2001 Dietary Recommended Intakes (DRI) for 22 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences.

According to the USDA’s Nutrient Content of the U.S. Food Supply for 1909-1999, iron consumption levels increased from 13.7 milligrams per day in 1909-19 to 23.7 milligrams per day in 1990-1999. This increase is largely due to the fortification and increase in consumption of cereals, flours, breads, and enriched grains. Grains were the number one food source supply of iron in U.S. diets; meats, poultry, and seafood ranked second.

Where do we get iron?

Dietary sources of iron are found in two forms: heme iron and nonheme iron. Heme sources are provided by animal tissues (meats) and are readily absorbed. Approximately 40% of iron found in meat is heme, with the best sources being liver, seafood, fish, lean meat, and poultry.

Nonheme iron is provided from plant sources and elemental components of animal tissues. It is less efficiently absorbed, and its absorption amount depends upon the body’s needs (if there are low stores, more iron will be absorbed and vice versa). Nonheme sources that are high in iron include cooked spinach, beans, eggs, nuts, fortified breads, cereals, and flours.

The foods that supply the greatest amount of iron in the U.S. diet today include fortified cereals, bread, cakes, cookies, doughnuts, and pasta; beef; dried beans and lentils; and poultry. Foods that contain small amounts of iron (such as le-

gumes and dried fruits), but are not considered good sources, can contribute significant amounts of iron to an individual's diet if these foods are eaten often or in large amounts.

What about enriched or fortified foods?

Pasta, white rice, and most breads made from refined flours are enriched with iron, because iron is one of the nutrients lost in processing. Other nutrients added to refined flours and pasta include thiamin, niacin, and riboflavin. Enriched products or products made from enriched flour are labeled as such. Minimum and maximum enrichment levels are specified for thiamin, riboflavin, and niacin, but only a minimum level of iron is required in farina. Thus, iron enrichment levels for farina vary from brand to brand.

Most ready-to-eat and instant-prepared cereals are fortified with iron. Fortified, ready-to-eat cereals usually contain at least 25 to 30% of the U.S. RDA for iron. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

Do we get enough iron?

According to the National Health and Nutrition Examination Survey (NHANES) III, intakes for men generally exceed the RDA, whereas most women consume lower than the RDA. A key point to remember is that the RDA for premenopausal women is 10 milligrams higher than the RDA for men, thus making it more challenging for women in this age group to consume an adequate amount of iron. The ability of the body to absorb and utilize iron from different foods varies. The iron in meat, poultry, and fish is absorbed and utilized more readily than iron in other foods. The presence of these animal products in a meal increases the availability of iron from other foods. The body increases or decreases iron absorption according to need. The body absorbs iron more efficiently when iron stores are low and during growth spurts or pregnancy. The presence of vitamin C (ascorbic acid) in a meal also increases iron absorption. Tea, coffee, or red wine; or an excess of zinc, manganese, or calcium can decrease iron absorption.

The most common indication of an iron deficiency is iron deficiency anemia, a condition in which the size and number of red blood cells are reduced. This condition may result from inadequate intake of iron or from blood loss. Anemia results in decreased oxygen in the blood, and can cause tiredness, headaches, irritability, and or depression. Anemia can also be caused by heavy blood loss through heavy menses, ulcers, hemorrhoids, and colon cancer.

Toxicity can occur if too much iron is absorbed. The major cause of this is most often hemochromatosis, a hereditary condition. This is a rare condition and is caused by a distinct gene that favors excessive iron absorption if it is readily available in the diet. Saturation of iron in the tissues can lead to tissue damage, specifically damage to the liver and heart.

How can we get enough iron?

Eating a variety of foods that contain iron is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Many doctors recommend feeding a fortified milk formula or breakfast cereal, or giving an iron supplement to infants and toddlers, because it is especially difficult to meet their iron needs. Doctors usually prescribe iron supplements for pregnant or lactating women. For vegetarians or vegans, it is important to consume sufficient amounts of moderately-rich iron foods, such as beans, legumes, and fortified breads, cereals, and flours. Soy products are typically good sources of iron as well. The list of foods in the table in this fact sheet will help you select those that are good sources of iron as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How to prepare foods to retain iron

Iron skillets used for cooking can add to the total iron intake of the food being cooked in them, especially when acidic foods are cooked (such as tomato sauce). However, iron can be lost using other cooking methods even under the best conditions. To retain iron:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What is a serving?

The serving sizes used in the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, a cup of cooked spinach contains more iron than a cup serving of spinach served raw, because the cooked spinach weighs more. Therefore, the cooked spinach appears on the list, while the raw form does not. Raw spinach provides the nutrient—but just not enough in a one-cup serving to be considered a good source.

Good Sources of Iron

Food	Selected Serving Size	Iron Content	% U.S. RDA
Breads, cereals, and other grain products			
Bagel, plain	1 medium	1.8-4.3 mg	10-24%
Farina, regular or quick, cooked	2/3 cup	4.5-7.0 mg	25-39%
Muffin, bran	1 medium	1.8-4.3 mg	10-24%
Egg noodles, cooked	1 cup	1.8-4.3 mg	10-24%
Oatmeal, instant, fortified, prepared	2/3 cup	4.5-7.0 mg	25-39%
Pita bread, plain or whole-wheat	1 small	1.8-4.3 mg	10-24%
Pretzel, soft	1	1.8-4.3 mg	10-24%
Ready-to-eat cereals, fortified	1 ounce	4.5-7.0 mg	25-39%
Rice, white, regular or converted, cooked	2/3 cup	1.8-4.3mg	10-24%
Fruits			
Apricots, dried, uncooked, unsweetened	1/2 cup	1.8-4.3 mg	10-24%
Vegetables			
Beans, lima, cooked	1/2 cup	1.8-4.3 mg	10-24%
Spinach, cooked	1/2 cup	4.5-7.0 mg	25-39%
Meat, poultry, fish, and alternates			
Ground beef, extra lean, lean or regular; baked, broiled	1 patty	1.8-4.3 mg	10-24%
Pot roast, braised, lean only	3 ounces	1.8-4.3 mg	10-24%
Roast, rib, roasted, lean only	3 ounces	1.8-4.3 mg	10-24%
Short ribs, braised, lean only	3 ounces	1.8-4.3 mg	10-24%
Steak, baked, broiled or braised, lean only	3 ounces	1.8-4.3 mg	10-24%
Stew meat, simmered, lean only	3 ounces	1.8-4.3 mg	10-24%
Liver, fried beef			
Beef	3 ounces	4.5-7.0 mg	25-39%
Calf	3 ounces	1.8-4.3 mg	10-24%
Pork	3 ounces	7.4+ mg	40% or more
Chicken or turkey	1/2 cup diced	4.5-7.0 mg	25-39%
Liverwurst	1 ounce	1.8-4.3 mg	10-24%
Tongue, braised	3 ounces	1.8-4.3 mg	10-24%
Turkey, dark meat, roasted, without skin	3 ounces	1.8-4.3 mg	10-24%
Fish and Seafood			
Clams, steamed, boiled, or canned, drained	3 ounces	7.4+ mg	40% or more
Mackerel, canned, drained	3 ounces	1.8-4.3 mg	10-24%
Mussels, steamed, boiled, or poached	3 ounces	1.8-4.3 mg	10-24%
Oysters			
Baked, broiled, or steamed	3 ounces	7.4+ mg	40% or more
Canned, undrained	3 ounces	4.5-7.0 mg	25-39%
Shrimp, broiled, steamed, boiled, or canned, drained	3 ounces	1.8-4.3 mg	10-24%
Trout, baked or broiled	3 ounces	1.8-4.3 mg	10-24%
Dry Beans, Peas, and Lentils			
Beans, black eyed peas (cowpeas), chickpeas			
(garbanzo beans), red kidney, or white, cooked	1/2 cup	1.8-4.3 mg	10-24%
Lentils, cooked	1/2 cup	1.8-4.3 mg	10-24%
Soybeans, cooked	1/2 cup	4.5-7.0 mg	25-39%
Nuts and Seeds			
Pine nuts (pignolias)	2 tablespoons	1.8-4.3 mg	10-24%
Pumpkin or squash seeds, hulled, roasted	2 tablespoons	1.8-4.3 mg	10-24%
Breads, pasta, and cereals listed are enriched unless otherwise noted. See section on enriched or fortified foods. Remember that meats, poultry, and seafood are the best absorbed sources by the body, only some of the iron content in plant-based foods is absorbed regardless of the amount of iron the food contains. All values are based upon the U.S. RDA for iron, 18 milligrams per day.			

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