# Importance of Vitamins

Standard 5: Students will identify the sources and functions of select vitamins, minerals and water and apply appropriate food preparation techniques to foods high in these nutrients.

• Objective 1: Identify select vitamins, their food sources, functions and deficiencies in the body.

Directions:

- As you move through the different stations in the classroom today, you will have the
  opportunity to learn about some of vitamins that are needed in our bodies. You will also have
  the opportunity to try some of the foods in which these vitamins are found.
- After you have gone through each of the stations, cut and paste the correct information in the missing areas on this worksheet.
- Draw at least one example for each food on the space on the backside of this chart. This must be colored and labeled correctly.

Water-Soluble Vitamins	Essential For	Sources
Folate (Folacin/Folic Acid)		
Vitamin <b>C</b>		
Fat-Soluble Vitamins	Essential For	Source.s
Vitamin A		
Vitamin D		
Vitamin E		
Vitamin K		

### Vitamins-Cut & Paste

#### **Essential** For

Enhances hair, skin and helps prevent night blindness. Helps support immune system.	Healthy bones, teeth skin, & brain function. Helps form collagen & aids in healing. Prevents scurry.	Help build and maintain strong bones & teeth. Called the "sunshine vitamin". Often added to milk products
Protects membranes of white & red blood cells. Provides protection against cell damage.	Helps blood to clot.	Prevents neural tube birth disorders, such as spina bifida. Protection from heart disease. Promotes cellular health

#### Sources

Sweet Potatoes, Carrots, Dark Leafy	Bell Peppers, Dark Leafy	Cod Liver Oil, Canned Tuna in water,
Greens, Winter Squashes, Dried	Greens, Kiwi, Broccoli, Berries, Citrus	Canned Sardines in oil, Milk, Yogurt,
Apricots, Cantaloupe, Bell Peppers,	Fruits, Tomatoes, Peas,	Cheese, Liver, Egg Yolk, and
Fish, Liver, and Tropical Fruits.	and Papayas.	Sunlight.
Spanish, Almonds, Sunflower Seeds,	Leafy green vegetables, such as	Basil, Kale, Green Onions/Scallions,
Avocados, Shrimp, Rainbow Trout,	spinach. Citrus fruits, such as orange	Brussels Sprouts, Chili Powder,
Olive Oil, Broccoli, Butternut Squash,	juice. Beans. Breads. Cereals. Rice.	Asparagus, Fennel, Leeks, Okra,
Kiwi	Pastas.	Cucumbers, Soy Beans, Olive Oil.

### Minerals-Cut & Paste

#### **Essential** For

Helps bones, teeth, blood	Regulates fluids, heart and	Regulates fluids, muscles,
serum, clotting, muscles, and	other muscles, nerves.	heart, nerves.
nerves.	Prevents Irregularly of heart	Too much causes high blood
Prevents Osteoporosis	and dehydration.	pressure.
Blood –	Help provide body with strong	
<ul> <li>hemoglobin, red cells,</li> </ul>	teeth, works with calcium.	
carries oxygen to cells		
Iron decency causes anemia.	Prevents Tooth decay.	

#### Sources

Milk, dates, broccoli, parsley, greens - spinach	Oranges, peaches, pears, bananas, dates, apples, raisins, avocados.	Table salt, Cured Meats • Sausage • Bacon
Dates, dried fruits, eggs, legumes, whole grains, watermelon, dark leafy vegetables.	Fluoridated water, fish, eggs, milk, some toothpastes.	

# Minerals in the Body

Standard 5: Students will identify the sources and functions of select vitamins, minerals and water and apply appropriate food preparation techniques to foods high in these nutrients.

• Objective 2: Identify select minerals, their food sources, functions, and deficiencies in the body.

Directions:

- As you move through the different stations in the classroom today, you will have the
  opportunity to learn about how minerals help our bodies. You will also have the opportunity to
  try some of the foods in which these minerals are found.
- After you have gone through each of the stations, cut and paste the correct information in the missing areas on this worksheet.
- Draw at least one example for each food on the space on the backside of this chart. This must be colored and labeled correctly.

Macro Minerals	Essential For	Sources
Calcium		
Potassium		
Sodium		
Micro Minerals	Essential For	Sources
Iron		
Fluoride		

### **Folate: Folic Acid, Folacin**

#### What is Folate?

Folate, also known as folic acid or folacin, aids in protein metabolism, promoting red blood cell formation, and lowering the risk for neural tube birth defects. Folate may also play a role in controlling homocysteine levels, thus reducing the risk for coronary heart disease.

#### **Food Sources for Folate**

Sources of folate include liver, kidney, dark green leafy vegetables, meats, fish, whole grains, fortified grains and cereals, legumes, and citrus fruits. Not all whole grain products are fortified with folate. Check the nutrition label to see if folic acid has been added.

### How much Folate

The Recommended Dietary Allowance (RDA) for folate is 400 mcg/day for adult males and females. Pregnancy will increase the RDA for folate to 600 mcg/day.

#### **Folate Deficiency**

Folate deficiency affects cell growth and protein production, which can lead to overall impaired growth. Deficiency symptoms also include anemia and diarrhea. A folate deficiency in women who are pregnant or of child bearing age may result in the delivery of a baby with neural tube defects such as spina bifida.

#### **Too much Folate**

Over consumption of folate offers no known benefits, and may mask B12 deficiency as well as interfere with some medications.

### Vitamin C

#### What is Vitamin C

The body needs vitamin C, also known as ascorbic acid or ascorbate, to remain in proper working condition. Vitamin C benefits the body by holding cells together through collagen synthesis; collagen is a conn ective tissue that holds muscles, bones, and other tissues together. Vitamin C also aids in wound healing, bone and tooth formation, strengthening blood vessel walls, improving immune system function, increasing absorption and utilization of iron, and acting as an antioxidant.



Since our bodies cannot produce or store vitamin C, an adequate daily intake of this nutrient is essential for optimum health. Vitamin C works with vitamin E as an antioxidant, and plays a crucial role in neutralizing free radicals throughout the body. An antioxidant can be a vitamin, mineral, or a carotenoid, present in foods, that slows the oxidation process and acts to repair damage to cells of the body. Studies suggest that vitamin C may reduce the risk of certain cancers, heart disease, and cataracts. Research continues to document the degree of these effects.

#### **Food Sources for Vitamin C**

Consuming vitamin C-rich foods is the best method to ensure an adequate intake of this vitamin. While many common plant foods contain vitamin C, the best sources are citrus fruits. For example, one orange, a kiwi fruit, 6 oz. of grapefruit juice or 1/3 cup of chopped sweet red pepper each supply enough vitamin C for one day.

#### How much Vitamin C

The Recommended Dietary Allowance (RDA) for Vitamin C is 90 mg/day for adult males and 75 mg/day for adult females. For those who smoke cigarettes, the RDA for vitamin C increases by 35 mg/day, in order to counteract the oxidative effects of nicotine.

#### Vitamin C Deficiency

Although rare in the United States, severe vitamin C deficiency may result in the disease known as scurvy, causing a loss of collagen strength throughout the body. Loss of collagen results in loose teeth, bleeding and swollen gums, and improper wound healing. More commonly, vitamin C deficiency presents as a secondary deficiency in alcoholics, the elderly, and in smokers.

The following conditions have been shown to increase vitamin C requirements:

- Environmental stress, such as air and noise pollution
- Use of certain drugs, such as oral contraceptives
- Tissue healing of wounds
- Growth (children from 0- 12 months, and pregnant women)
- Fever and infection
- Smoking.

### Too Much Vitamin C

Despite being a water-soluble vitamin that the body excretes when in excess, vitamin C overdoses have been shown to cause kidney stones, gout, diarrhea, and rebound scurvy.

### **Can Vitamin C Prevent the Common Cold?**

The controversy over using mega doses of vitamin C to prevent or cure the common cold and other disorders has not been resolved. Recent studies have shown that an increased intake of vitamin C over 500 mg per day does not increase a body's overall level of vitamin C. Therefore, intake over 500 mg per day may not result in any additional benefits from vitamin C.

### <u>Vitamin A</u>

#### What is Vitamin A

Vitamin A, also called retinol, has many functions in the body. In addition to helping the eyes adjust to light changes, vitamin A plays an important role in bone growth, tooth development, reproduction, cell division, gene expression, and regulation of the immune system. The skin, eyes, and mucous membranes of the mouth, nose, throat and lungs depend on vitamin A to remain moist. Vitamin A is also an important antioxidant that may play a role in the prevention of certain cancers.



#### Food Sources for Vitamin A

Eating a wide variety of foods is the best way to ensure that the body gets enough vitamin A. The retinol, retinal, and retinoic acid forms of vitamin A are supplied primarily by foods of animal origin such as dairy products, fish and liver. Some foods of plant origin contain the antioxidant, beta-carotene, which the body converts to vitamin A. Beta-carotene, comes from fruits and vegetables, especially those that are orange or dark green in color. Vitamin A sources also include carrots, pumpkin, winter squash, dark green leafy vegetables and apricots, all of which are rich in beta-carotene.

#### How much Vitamin A

The recommendation for vitamin A intake is expressed as micrograms (mcg) of retinol activity equivalents (RAE). Retinol activity equivalents account for the fact that the body converts only a portion of beta-carotene to retinol. One RAE equals 1 mcg of retinol or 12 mcg of beta-carotene. The Recommended Dietary Allowance (RDA) for vitamin A is 900 mcg/ day for adult males and 700 mcg/day for adult females. Compared to vitamin A, it takes twice the amount of carotene rich foods to meet the body's vitamin A requirements, so one may need to increase consumption of carotene containing plant foods. Recent studies indicate that vitamin A requirements may be increased due to hyperthyroidism, fever, infection, cold, and exposure to excessive amounts of sunlight. Those that consume excess alcohol or have renal disease should also increase intake of vitamin A.

#### Vitamin A Deficiency

Vitamin A deficiency in the United States is rare, but the disease that results is known as xerophthalmia. It most commonly occurs in developing nations usually due to malnutrition. Since vitamin A is stored in the liver, it may take up to 2 years for signs of deficiency to appear. Night blindness and very dry, rough skin may indicate a lack of vitamin A. Other signs of possible vitamin A deficiency include decreased resistance to infections, faulty tooth development, and slower bone growth.

#### Too much Vitamin A

In the United States, toxic or excess levels of vitamin A are more of a concern than deficiencies. The Tolerable Upper Intake Level (UL) for adults is 3,000 mcg RAE (Table 2). It would be difficult to reach this level consuming food alone, but some multivitamin supplements contain high doses of vitamin A. If you take a multivitamin, check the label to be sure the majority of vitamin A provided is in the form of beta-carotene, which appears to be safe. Symptoms of vitamin A toxicity include dry, itchy skin, headache, nausea, and loss of appetite. Signs of severe overuse over a short period of time include dizziness, blurred vision and slowed growth. Vitamin A toxicity also can cause severe birth defects and may increase the risk for hip fractures.

## <u>Vitamin D</u>

#### <u>What is Vitamin D</u>

Vitamin D plays a critical role in the body's use of calcium and phosphorous. It works by increasing the amount of calcium absorbed from the small intestine, helping to form and maintain bones. Vitamin D benefits the body by playing a role in immunity and controlling cell growth. Children especially need adequate amounts of vitamin D to develop strong bones and healthy teeth.

#### **Food Sources for Vitamin D**

The primary food sources of vitamin D are milk and other dairy products

fortified with vitamin D. Vitamin D is also found in oily fish (e.g., herring, salmon and sardines) as well as in cod liver oil. In addition to the vitamin D provided by food, we obtain vitamin D through our skin which produces vitamin D in response to sunlight.

### How much Vitamin D

The Recommended Dietary Allowance (RDA) for vitamin D appears as micrograms (mcg) of cholecalciferol (vitamin D3) (Table 1). From 12 months to age fifty, the RDA is set at 15 mcg. Twenty mcg of cholecalciferol equals 800 International Units (IU), which is the recommendation for maintenance of healthy bone for adults over fifty. Table 1 lists additional recommendations for various life stages.

Exposure to ultraviolet light is necessary for the body to produce the active form of vitamin D. Ten to fifteen minutes of sunlight without sunscreen on the hands, arms and face, twice a week is sufficient to receive enough vitamin D. This can easily be obtained in the time spent riding a bike to work or taking a short walk. In order to reduce the risk for skin cancer one should apply sunscreen with an SPF of 15 or more, if time in the sun exceeds 10 to 15 minutes.

### Vitamin D Deficiency

Symptoms of vitamin D deficiency in growing children include rickets (long, soft bowed legs) and flattening of the back of the skull. Vitamin D deficiency in adults may result in osteomalacia (muscle and bone weakness), and osteoporosis (loss of bone mass).

Recently published data introduces a concern that some adults and children may be more prone to developing vitamin D deficiency due to an increase in sunscreen use. In addition, those that live in inner cities, wear clothing that covers most of the skin, or live in northern climates where little sun is seen in the winter are also prone to vitamin D deficiency. Since most foods have very low vitamin D levels (unless they are enriched) a deficiency may be more likely to develop without adequate exposure to sunlight. Adding fortified foods to the diet such as milk, and for adults including a supplement, are effective at ensuring adequate vitamin D intake and preventing low vitamin D levels.

Vitamin D deficiency has been associated with increased risk of common cancers, autoimmune diseases, hypertension, and infectious disease. In the absence of adequate sun exposure, at least 800 to 1,000 IU of vitamin D3 may be needed to reach the circulating level required to maximize vitamin D's benefits.

### <u>Who is at Risk</u>

These populations may require extra vitamin D in the form of supplements or fortified foods:

• *Exclusively breast-fed infants*: Human milk only provides 25 IU of vitamin D per liter. All breast-fed and partially breast-fed infants should be given a vitamin D supplement of 400 IU/day



- *Dark Skin*: Those with dark pigmented skin synthesize less vitamin D upon exposure to sunlight compared to those with light pigmented skin.
- *Elderly*: This population has a reduced ability to synthesize vitamin D upon exposure to sunlight, and is also more likely to stay indoors and wear sunscreen which blocks vitamin D synthesis.
- *Covered and protected skin*: Those that cover all of their skin with clothing while outside, and those that wear sunscreen with an SPF factor of 8, block most of the synthesis of vitamin D from sunlight.
- *Disease*: Fat mal-absorption syndromes, inflammatory bowel disease (IBD), and obesity are all known to result in a decreased ability to absorb and/or use vitamin D in fat stores.

### <u>Too much Vitamin D</u>

The Tolerable Upper Intake Level (UL) for vitamin D is set at 100 mcg for people 9 years of age and older (Table 2). High doses of vitamin D supplements coupled with large amounts of fortified foods may cause accumulations in the liver and produce signs of poisoning. Signs of vitamin D toxicity include excess calcium in the blood, slowed mental and physical growth, decreased appetite, nausea and vomiting.

It is especially important that infants and young children do not consume excess amounts of vitamin D regularly, due to their small body size.

## <u>Vitamin E</u>

#### <u>What is Vitamin E</u>

Vitamin E benefits the body by acting as an antioxidant, and protecting vitamins A and C, red bloo d cells, and essential fatty acids from destruction. Research from decades ago suggested that taking antioxidant supplements, vitamin E in particular, might help prevent heart disease and cancer. However, newer findings indicate that people who take antioxidant and vitamin E supplements are not better protected against heart disease and cancer than non-supplement users. Many studies show a link between regularly eating an antioxidant rich diet full of fruits and vegetables, and a lower risk for heart



disease, cancer, and several other diseases. Essentially, recent research indicates that to receive the full benefits of antioxidants and phytonutrients in the diet, one should consume these compounds in the form of fruits and vegetables, not as supplements.

#### **Food Sources for Vitamin E**

About 60 percent of vitamin E in the diet comes from vegetable oil (soybean, corn, cottonseed, and safflower). This also includes products made with vegetable oil (margarine and salad dressing). Vitamin E sources also include fruits and vegetables, grains, nuts (almonds and hazelnuts), seeds (sunflower) and fortified cereals.

#### How much Vitamin E

The Recommended Dietary Allowance (RDA) for vitamin E is based on the most active and usable form called alpha-tocopherol. Food and supplement labels list alpha-tocopherol as the unit International units (IU) not in milligrams (mg). One milligram of alpha-tocopherol equals to 1.5 International Units (IU). RDA guidelines state that males and females over the age of 14 should receive 15 mcg of alpha-tocopherol per day. Consuming vitamin E in excess of the RDA does not result in any added benefits.

#### Vitamin E Deficiency

Vitamin E deficiency is rare. Cases of vitamin E deficiency usually only occur in premature infants and in those unable to absorb fats. Since vegetable oils are good sources of vitamin E, people who excessively reduce their total dietary fat may not get enough vitamin E.

#### Too much Vitamin E

The Tolerable Upper Intake Level (UL) for vitamin E is shown in Table 2. Vitamin E obtained from food usually does not pose a risk for toxicity. Supplemental vitamin E is not recommended due to lack of evidence supporting any added health benefits. Mega doses of supplemental vitamin E may pose a hazard to people taking blood-thinning medications such as Coumadin (also known as warfarin) and those on statin drugs.

### <u>Vitamin K</u>

#### <u>What is Vitamin K</u>

Vitamin K is naturally produced by the bacteria in the intestines, and plays an essential role in normal blood clotting, promoting bone health, and helping to produce proteins for blood, bones, and kidneys.

#### **Food Sources for Vitamin K**

Good food sources of vitamin K are green, leafy-vegetables such as turnip greens, spinach, cauliflower, cabbage and broccoli, and certain vegetables oils including soybean oil, cottonseed oil, canola oil and olive oil. Animal foods, in general, contain limited amounts of vitamin K.

#### How much Vitamin K

To help ensure people receive sufficient amounts of vitamin K, an Adequate Intake (AI) has been established for each age group.

#### Vitamin K Deficiency

Without sufficient amounts of vitamin K, hemorrhaging can occur. Vitamin K deficiency may appear in infants or in people who take anticoagulants, such as Coumadin (warfarin), or antibiotic drugs. Newborn babies lack the intestinal bacteria to produce vitamin K and need a supplement for the first week. Those on anticoagulant drugs (blood thinners) may become vitamin K deficient, but should not change their vitamin K intake without consulting a physician. People taking antibiotics may lack vitamin K temporarily because intestinal bacteria are sometimes killed as a result of long-term use of antibiotics. Also, people with chronic diarrhea may have problems absorbing sufficient amounts of vitamin K through the intestine and should consult their physician to determine if supplementation is necessary.

#### Too much Vitamin K

Although no Tolerable Upper Intake Level (UL) has been established for vitamin K, excessive amounts can cause the breakdown of red blood cells and liver damage. People taking blood-thinning drugs or anticoagulants should moderate their intake of foods with vitamin K, because excess vitamin K can alter blood clotting times. Large doses of vitamin K are not advised.

# <u>Calcium</u>

#### What is Calcium?

Calcium is an important nutrient for your body and for your health. Calcium helps your heart, muscles, and nerves function. It is also important for bone health. Ninety-nine percent of your body's calcium is stored in your bones. Children and teenagers need adequate calcium in their diets so they can maximize the calcium storage in their bones. In later years, adequate dietary calcium helps minimize calcium loss from the bones.



Studies show that over half of Americans do not get the recommended calcium from their diets. The best sources of calcium are dairy products. Calcium should be provided in meals and snacks throughout the day.

#### **Physical Activity**

Weight-bearing exercise helps keep bones strong and prevents calcium loss. Calcium loss can take place at any age, even during childhood. For example, astronauts (weightlessness in space) and sedentary people are at risk for losing calcium from their bones. Weight-bearing exercise includes walking, jogging, weight lifting, dancing, and soccer. Try a daily activity with your family, neighbors, or friends walking at the mall, joining a fitness club, or doing a hobby. Aim for at least 30 minutes of activity on most days of the week. You can add up the minutes throughout the day. It does not need to be all at one time.

#### Lactose Intolerance

It has been estimated that between 30 and 50 million Americans are lactose intolerant. People who are lactoseintolerant cannot digest lactose, a natural sugar found in milk and dairy products. Symptoms begin anywhere from 30 minutes to two hours after eating or drinking foods containing lactose. Symptoms can vary depending on the person, but include gas, nausea, diarrhea, stomach cramps, and vomiting.

If you have trouble digesting dairy products, first try smaller amounts in meals and snacks spread throughout the day. Other solutions include: adding lactase enzyme drops to milk; choosing hard cheeses (like cheddar), and yogurt with active cultures, that are low in lactose; purchasing reduced-lactose dairy products; or taking lactase enzyme tablets before you eat or drink dairy products.

For individuals who either cannot tolerate any lactose or do not like dairy products, following are some calcium-rich alternatives. Calcium supplements may be another option.

#### **Calcium and Fat**

Although dairy products are high in calcium, they can also be high in fat. Read the Nutrition Facts label to find lower-fat options. The label lists the grams (g) of fat in the serving and the "%" contribution to the recommended fat level for the day. Some lower-fat options include: nonfat or 1% milk; reduced-fat cheese; and many of the calcium-rich alternatives to dairy, such as dry beans.

#### **Calcium Rich Foods**

Milk and Dairy products. Dry Beans, such as black-eyed peas, kidney beans, black beans. Turnip greens, collard greens, broccoli, and kale. Sardines, Tofu, and Fortified orange juice

### <u>Potassium</u>

#### **Potassium in the Body**

Potassium is a mineral that your body needs to work properly. It is a type of electrolyte. Your body needs potassium to:

- Build proteins
- Break down and use carbohydrates
- Build muscle
- Maintain normal body growth
- Control the electrical activity of the heart
- Control the acid-base balance



#### Food Sources

Many foods contain potassium. All meats (red meat and chicken) and fish such as salmon, cod, flounder, and sardines are good sources of potassium. Soy products and veggie burgers are also good sources of potassium. Vegetables including broccoli, peas, lima beans, tomatoes, potatoes (especially their skins), sweet potatoes, and winter squash are all good sources of potassium.

Fruits that contain significant amounts of potassium include citrus fruits, cantaloupe, bananas, kiwi, prunes, and apricots. Dried apricots contain more potassium than fresh apricots. Milk, yogurt, and nuts are also excellent sources of potassium.

People with kidney problems, especially those on dialysis, should not eat too many potassium-rich foods. The doctor or nurse will recommend a special diet.

### Side Effects

Having too much or too little potassium in the body can cause serious health problems.

A low blood level of potassium is called hypokalemia. It can cause weak muscles, abnormal heart rhythms, and a slight rise in blood pressure. You may have hypokalemia if you:

- Take diuretics (water pills) to treat high blood pressure or heart failure
- Take too many laxatives
- Have severe or prolonged vomiting and diarrhea
- Have certain kidney or adrenal gland disorders

Too much potassium in the blood is known as hyperkalemia. It may cause abnormal and dangerous heart rhythms. Some common causes include:

- Poor kidney function
- Heart medicines called angiotensin converting enzyme (ACE) inhibitors and angiotensin 2 receptor blockers (ARBs)
- Potassium-sparing diuretics (water pills) such as spironolactone
- Severe infection

## <u>Sodium</u>

#### **Sodium in the Body**

Sodium is an element that the body needs to work properly. Salt contains sodium. The body uses sodium to control blood pressure and blood volume. Your body also needs sodium for your muscles and nerves to work properly.

#### **Food Sources**

Sodium occurs naturally in most foods. The most common form of sodium is sodium chloride, which is table salt. Milk, beets, and celery also naturally contain sodium. Drinking water, also contains sodium, but the amount depends on the source.

Sodium is also added to many food products. Some of these added forms are monosodium glutamate (MSG), sodium nitrite, sodium saccharin, baking soda (sodium bicarbonate), and sodium benzoate. These are in items such as Worcestershire sauce, soy sauce, onion salt, garlic salt, and bouillon cubes.

Processed meats like bacon, sausage, and ham, and canned soups and vegetables also contain added sodium. Fast foods are generally very high in sodium.

#### **Side Effects**

Too much sodium in the diet may lead to:

- High blood pressure in some people
- A serious buildup of fluid in people with congestive heart failure, cirrhosis of the liver, or kidney disease

#### **Recommendations**

Sodium in the diet (called dietary sodium) is measured in milligrams (mg). Table salt is 40% sodium; 1 teaspoon of table salt contains 2,300 mg of sodium.

Healthy adults should limit sodium intake to 2,300 mg per day. Adults with high blood pressure should have no more than 1,500 mg per day. Those with congestive heart failure, liver cirrhosis, and kidney disease may need much lower amounts.

There are no specific recommended amounts of sodium for infants, children, and teens. Eating habits and attitudes about food that are formed during childhood are likely to influence eating habits for life. For this reason, it is a good idea for children to avoid eating too much salt.



### <u>Iron</u>

#### **Iron in the Body**

Iron is a mineral found in every cell of the body. Iron is considered an essential mineral because it is needed to make hemoglobin, a part of blood cells. The human body needs iron to make the oxygen-carrying proteins hemoglobin and myoglobin. Hemoglobin is found in red blood cells and myoglobin is found in muscles.

#### **Food Sources**

The best sources of iron include:

- Dried beans
- Dried fruits
- Eggs (especially egg yolks)
- Iron-fortified cereal
- Liver
- Lean red meat (especially beef)
- Oysters
- Poultry, dark red meat
- Salmon
- Tuna
- Whole grains

If you mix some lean meat, fish, or poultry with beans or dark leafy greens at a meal, you can improve absorption of vegetable sources of iron up to three times. Foods rich in vitamin C ( such as citrus, strawberries, tomatoes, and potatoes) also increase iron absorption. Cooking foods in a cast-iron skillet can also help to increase the amount of iron provided.

Some foods reduce iron absorption. For example, commercial black or pekoe teas contain substances that bind to dietary iron so it cannot be used by the body.

### Low Iron Levels

The human body stores some iron to replace any that is lost. However, low iron levels over a long period of time can lead to iron deficiency anemia. Symptoms include lack of energy, shortness of breath, headache, irritability, dizziness, or weight loss. Physical signs of iron deficiency are a pale tongue and spoon-shaped nails. Those at risk for low iron levels include:

- Women who are menstruating, especially if they have heavy periods
- Women who are pregnant or who have just had a baby
- Long-distance runners
- People with any type of bleeding in the intestines (for example, a bleeding ulcer)
- People who frequently donate blood
- People with gastrointestinal conditions that make it hard to absorb nutrients from food

Babies and young children are at risk for low iron levels if they do get the right foods. Babies moving to solid foods should eat iron-rich foods. Infants are born with enough iron to last about six months. An infant's additional iron needs are met by breast milk. Infants that are not breastfed should be given an iron supplement or iron-fortified infant formula.



Children between age 1 and 4 grow rapidly. This uses up iron in the body. Children of this age should be given iron-fortified foods or iron supplements.

Milk is a very poor source of iron. Children who drink large quantities of milk and avoid other foods may develop "milk anemia." Recommended milk intake is two to three cups per day for toddlers.

#### **High Iron Levels**

The genetic disorder called hemochromatosis affects the body's ability to control how much iron is absorbed. This leads to too much iron in the body. Treatment consists of a low-iron diet, no iron supplements, and phlebotomy (blood removal) on a regular basis.

It is unlikely that a person would take too much iron. However, children can sometimes develop iron poisoning by swallowing too many iron supplements. Symptoms of iron poisoning include:

- Fatigue
- Anorexia
- Dizziness
- Nausea
- Vomiting
- Headache
- Weight loss
- Shortness of breath
- Grayish color to the skin