Vitamins

Definition: A group of substances essential to normal metabolism, growth and development, and regulation of cell function; vitamins work together with enzymes, co-factors, and other substances.
Food Sources: Vitamins are obtained from food, except for vitamin D and vitamin K, which the body can synthesize. There are 13 vitamins needed by the body: Vitamins A, C, D, E, K, and the B vitamins (thiamine, riboflavin, niacin, pantothenic acid and biotin, vitamin B6, vitamin B12, and folacin). In addition, vitamin A, which comes from animal sources such as eggs and meat, is present in the form of a precursor, beta-carotene, when manufactured by plants.

FAT-SOLUBLE VITAMINS:
Vitamin A is found in milk, cheese, cream, liver, kidney, and cod and halibut fish oil. All of these sources, except for skim milk that has been fortified with vitamin A, are high in saturated fat and cholesterol. The vegetable sources of beta-carotene are fat and cholesterol free. The body regulates the conversion of beta-carotene to vitamin A based on the body's needs. Sources of beta-carotene are carrots, pumpkin, sweet potatoes, winter squashes, cantaloupe, pink grapefruit, apricots, broccoli, spinach and most dark green leafy vegetables. The more intense the color of a fruit or vegetable the higher the beta-carotene content.
Vitamin D is found in cheese, butter, margarine, cream, fortified milk (all milk in the United States is fortified with Vitamin D), fish, oysters, and fortified cereals. The body can synthesize vitamin D when the skin is exposed to sunshine.
Vitamin E is found in wheat germ, corn, nuts, seeds, olives, spinach, asparagus, and other green leafy vegetables, vegetable oils (corn, sunflower, soybean, and cottonseed) and products made from them such as margarine.
Vitamin K is found in cabbage, cauliflower, spinach, and other green leafy vegetables, cereals, soybeans, and other vegetables. Bacteria in the intestines normally also produce vitamin K.

WATER-SOLUBLE VITAMINS
Thiamine (vitamin B1) is found in fortified breads, cereals, pasta, whole grains (especially wheat germ), lean meats (especially pork), fish, dried beans, peas, and soybeans. Dairy products and milk, fruits, and vegetables are not very high in thiamine, but when consumed in large amounts they become a significant source. Niacin (vitamin B3) is found in dairy products, poultry, fish, lean meats, nuts, and eggs. Legumes and enriched breads and cereals also supply some niacin. Vitamin B12 is found in eggs, meat, poultry, shellfish, and milk and milk products. Pantothenic acid and biotin are found in eggs, fish, milk and milk products, whole-grain cereals, legumes, yeast, broccoli and other vegetables in the cabbage family, white and sweet potatoes, lean beef, and other foods.
Vitamin C (ascorbic acid) is found in citrus fruits, strawberries, tomatoes, broccoli, turnip greens and other greens, sweet and white potatoes, and cantaloupe. Most other fruits and vegetables contain some vitamin C; fish and milk contain small amounts.
Functions: Each vitamin has specific functions. If a certain vitamin is deficient, a deficiency disease results. Vitamin A: this fat-soluble vitamin helps in the formation and maintenance of healthy teeth, skeletal and soft tissue, mucous membranes, and skin. It is also known as retinol, as it generates the pigments that are necessary for the working of the retina. It promotes good vision, especially in dim light. It may also be required for reproduction and lactation. Beta carotene is a precursor to vitamin A; it has antioxidant properties. Thiamine(B1) helps the body cells convert carbohydrates into energy. It is also essential for the functioning of the heart and for healthy nerve cells and the brain. Riboflavin(B2) works with the other B vitamins and is important for body growth and red cell production. Similar to thiamine, it helps in releasing energy from carbohydrates. Vitamin B6 is also known as pyridoxine. The more protein a person eats the more B6 is required to use the protein. It helps in the formation of red blood cells and in the maintenance of normal brain function. It also assists in the synthesizing of antibodies in the immune system. Vitamin B12, like the other B vitamins, is important for metabolism. It helps in the formation of red blood cells and in the maintenance of the central nervous system. Pantothenic acid and biotin: pantothenic acid is essential for the metabolism of food. It is also essential in the synthesis of hormones and cholesterol. Biotin is essential for the metabolism of proteins and carbohydrates like the other B vitamins, and in the synthesis of hormones and cholesterol. Folacin works with vitamin B12 in the production of red blood cells. It is necessary for the synthesis of DNA, which controls heredity as well as tissue growth and cell function. Vitamin C is also known as ascorbic acid. It promotes healthy teeth and gums, helps in the absorption of iron, and in the maintenance of normal connective tissue. It also promotes wound healing. Vitamin D is also known as the "sunshine vitamin" since it is manufactured by the body after being exposed to sunshine. Ten to fifteen minutes of sunshine three times weekly is adequate to produce the body's requirement of vitamin D. It promotes the body's absorption of calcium, which is essential for the normal development of healthy teeth and bones. It also helps maintain the adequate blood levels of calcium and phosphorus, which are minerals. Vitamin E is also known as tocopherol; it is an antioxidant. It is also important in the formation of red blood cells and the use of vitamin K. Vitamin K is known as the clotting vitamin, because without it blood would not coagulate. Some studies indicate that it helps in maintaining strong bones in the elderly.
Recommendations: Recommended daily allowances (RDAs), are defined as the levels of intake of essential nutrients that, on the basis of scientific knowledge, the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of practically all healthy people.
The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.

Vitamin A; **Alternative Names**: Deficiency - vitamin A; vitamin A deficiency
Definition: Vitamin A is a fat-soluble vitamin.
Food Sources: Vitamin A comes from animal sources such as eggs and meat, and is present in the form of a precursor called beta-carotene, when manufactured by plants. Vitamin A is found in milk, cheese, cream, liver, kidney, cod and halibut fish oil. All of these sources, except for skim milk that has been fortified with vitamin A, are high in saturated fat and cholesterol. The vegetable sources of beta-carotene are fat and cholesterol free. The body regulates the conversion of beta-carotene to vitamin A, based on the body's needs. Sources of beta-carotene are carrots, pumpkin, sweet potatoes, winter squashes, cantaloupe, pink grapefruit, apricots,

broccoli, spinach, and most dark green, leafy vegetables. The more intense the color of a fruit or vegetable, the higher the beta-carotene content.

Functions: Vitamin A helps in the formation and maintenance of healthy teeth, skeletal and soft tissue, mucous membranes, and skin. It is also known as retinol, as it generates the pigments that are necessary for the working of the retina. It promotes good vision, especially in dim light. It may also be required for reproduction and lactation. Beta-carotene, which has antioxidant properties, is a precursor to vitamin A.

Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of almost all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.

Side Effects: Vitamin A deficiency can increase the susceptibility to infectious diseases, as well as cause vision problems. Large doses of vitamin A can be toxic. They can also cause abnormal fetal development in pregnant women. Increased amounts of beta-carotene can turn the color of skin to yellow or orange. The skin color returns to normal once the increased intake of beta-carotene is reduced.

Vitamin E; **Alternative Names**: Deficiency - vitamin E; tocopherol; vitamin E deficiency

Definition: Vitamin E is a fat-soluble vitamin; it is one of the vitamins that act as antioxidants.

Food Sources:Vitamin E is found in wheat germ, corn, nuts, seeds, olives, spinach, asparagus, and other green leafy vegetables, vegetable oils (corn, sunflower, soybean, and cottonseed), and products made from them such as margarine.

Functions: Vitamin E is an antioxidant that protects body tissue from the damage of oxidation. It is important in the formation of red blood cells and the use of vitamin K.

Recommendations

Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that, on the basis of scientific knowledge, the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of practically all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.

Side Effects: There is no known dietary deficiency of vitamin E. There are no known toxic effects to mega doses of vitamin E. Occasional side effects such as headache have been reported.

Vitamin C; Alternative Names: Ascorbic acid

Definition: A water-soluble vitamin that is necessary for normal growth and development.

Food Sources: Vitamin C (ascorbic acid) is found in green peppers, citrus fruits, strawberries, tomatoes, broccoli, turnip greens and other greens, sweet and white potatoes, and cantaloupe. Most other fruits and vegetables contain some vitamin C; fish and milk contain small amounts.

Functions: Vitamin C promotes healthy teeth and gums, helps in the absorption of iron, aids in the maintenance of normal connective tissue, and promotes wound healing. It also helps the body's immune system.

Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that, on the basis of scientific knowledge, the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of practically all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid. It is important that vitamin C be consumed every day since it is not a fat soluble vitamin, and cannot be stored for later use. It is water-soluble; therefore the body excretes it regularly.

Side Effects: A deficiency of vitamin C causes the disease scurvy, which is rare in the United States. Toxicity does not normally occur, since vitamin C is water-soluble and is regularly excreted by the body. Diarrhea is a possible (but uncommon) symptom associated with increased intake of vitamin C.

Thiamine; Alternative Names: Vitamin B1

Definition: One of the B vitamins, a group of water-soluble vitamins that participate in many of the chemical reactions in the body. Thiamine is important in the production of energy.

Food Sources: Thiamine (vitamin B1) is found in fortified breads, cereals, pasta, whole grains (especially wheat germ), lean meats (especially pork), fish, dried beans, peas, and soybeans. Dairy products and milk, fruits, and vegetables are not very high in thiamine, but when consumed in large amounts they become a significant source.

Functions: Thiamine (vitamin B1) helps the body cells convert carbohydrates into energy. It is also essential for the functioning of the heart, muscles and nervous system.

Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that the Food and Nutrition Board judged to be adequate to meet the known nutrient needs of almost all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.

Side Effects: A deficiency of thiamine can cause weakness, fatigue, and nerve damage. A total absence of thiamine can cause the disease called beriberi, which is very rare in the United States. There is no known toxicity to thiamine.

Riboflavin; Alternative Names: Deficiency - vitamin B2 (riboflavin); diet and riboflavin; vitamin B2; vitamin B2 (riboflavin) deficiency

Definition:A water-soluble vitamin required by the body for health, growth and reproduction; one of the B-complex vitamins.

Food Sources: Lean meats, eggs, legumes, nuts, green leafy vegetables, dairy products, and milk provide riboflavin in the diet. Breads and cereals are often fortified with riboflavin. Because riboflavin is destroyed by exposure to light, foods with riboflavin should not be stored in glass containers that are exposed to light.

Functions: Riboflavin (B2) works with the other B vitamins. It is important for body growth and red cell production, and helps in releasing energy from carbohydrates.

Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of almost all healthy people.

The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.
Side Effects: Deficiency of riboflavin is not common in the U.S. because this vitamin is plentiful in the food supply. Deficiency symptoms include dry and cracked skin and eyes that are sensitive to bright light. There is no known toxicity to riboflavin. Because riboflavin is a water-soluble vitamin, excess amounts are excreted
Vitamin B6; Alternative Names: Deficiency - vitamin B6 (pyridoxine); pyridoxine; vitamin B6 (pyridoxine) deficiency
Definition: A water-soluble vitamin; part of the vitamin B complex.
Food Sources: Vitamin B-6 is found in beans, nuts, legumes, eggs, meats, fish, whole grains, and fortified breads and cereals.
Functions: Vitamin B-6 plays a role in the synthesis of antibodies in the immune system. It helps maintain normal brain function and acts in the formation of red blood cells. It is also required for the chemical reactions of proteins. The higher the protein intake, the more the need for vitamin B6.
Recommendations: The average diet supplies adequate quantities of vitamin B6.
Side Effects: Large doses of vitamin B6 can cause neurological disorders and numbness. Deficiency of this vitamin is not common in the United States.

Pantothenic acid and biotin; **Alternative Names**: Diet and pantothenic acid/biotin
Definition: A water-soluble vitamin; part of the B vitamin complex.
Food Sources: Pantothenic acid and biotin are found in eggs, fish, milk and milk products, whole-grain cereals, legumes, yeast, broccoli and other vegetables in the cabbage family, white and sweet potatoes, lean beef, and other foods that are good sources of the B vitamins.
Functions: Pantothenic acid is essential for the metabolism of food. It is essential in the synthesis of hormones and cholesterol. Biotin is essential for the metabolism of proteins and carbohydrates (like the other B vitamins), and in the synthesis of hormones and cholesterol.
Recommendations: There are no established "recommended daily allowances" for either of these vitamins.
Side Effects: There are no known deficiencies of either pantothenic acid or biotin. Large doses of pantothenic acid do not produce symptoms other than (possibly) diarrhea. There are no known toxic symptoms associated with biotin

Vitamin K; **Alternative Names**: Deficiency - vitamin K; vitamin K deficiency (malabsorption)
Definition: Vitamin K is a fat-soluble vitamin that plays an important role in blood clotting.
Food Sources: Vitamin K is found in cabbage, cauliflower, spinach, and other green leafy vegetables, cereals, soybean, and other vegetables. The bacteria lining the gastrointestinal tract also make Vitamin K.
Functions: Vitamin K is known as the clotting vitamin, because without it blood would not clot. Some studies indicate that it helps in maintaining strong bones in the elderly.
Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of almost all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.
Side Effects: Vitamin K deficiency is very rare. It usually only occurs when there is an inability to absorb the vitamin.

Niacin; **Alternative Names**: Diet and niacin; nicotinic acid
Definition:A water-soluble vitamin required by the body for health, growth and reproduction; part of the vitamin B complex.
Food Sources: Niacin (also known as vitamin B3) is found in dairy products, poultry, fish, lean meats, nuts, and eggs. Legumes and enriched breads and cereals also supply some niacin.
Functions: Niacin assists in the functioning of the digestive system, skin, and nerves. It is also important for the conversion of food to energy.
Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of most healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of foods from the food guide pyramid.
Side Effects: A deficiency of niacin causes pellagra. The symptoms include inflamed skin, digestive problems, and mental impairment. Large doses of niacin can cause liver damage, peptic ulcers, and skin rashes. It can be used as a treatment for elevated total cholesterol levels, but should only be used with medical supervision.

Folacin; **Alternative Names**: Deficiency - vitamin B9 (folacin); diet and folacin; folacin (vitamin B9) deficiency; folate; folic acid; pteroylglutamic acid; vitamin B9; vitamin B9 (folacin) deficiency
Definition: A water-soluble vitamin of the B-complex group.
Food Sources: Beans and legumes; Citrus fruits and juices; Wheat bran and other whole grains; Dark green leafy vegetables; Poultry, pork, shellfish
Liver
Functions: Folacin acts as a coenzyme (with vitamin B-12 and vitamin C) in the breakdown (metabolism) of proteins and in the synthesis of new proteins. It is necessary for the production of red blood cells and the synthesis of DNA (which controls heredity), as well as tissue growth and cell function. It also increases the appetite and stimulates the formation of digestive acids. Synthetic folacin supplements may be used in the treatment of disorders associated with folacin deficiency and may also be part of the recommended treatment for certain menstrual problems and leg ulcers.
Recommendations: Recommended daily allowances (RDAs) are defined as the levels of intake of essential nutrients that, on the basis of scientific knowledge, the Food and Nutrition Board judges to be adequate to meet the known nutrient needs of practically all healthy persons. The best way to get the daily requirement of essential vitamins is to eat a balanced diet that contains a variety of

foods from the food guide pyramid. Most people in the United States get an adequate intake of folacin because it is plentiful in the food supply. Pregnant women often require additional supplementation as prescribed by the health care provider. Adequate folacin is important to women in their childbearing years because it has been shown to prevent some kinds of birth defects, including neural tube defects. Women in this age group should make an effort to consume foods that are good sources of folacin. Recent studies published by the Centers for Disease Control (CDC) suggest that women who receive supplements of folacin BEFORE CONCEPTION may reduce the risk for neural tube defects by 50%. Women who plan to become pregnant may want to discuss taking a multivitamin with their health care provider.

Side Effects Folacin deficiency may cause poor growth, graying hair, inflammation of the tongue (glossitis), mouth ulcers, peptic ulcer, and diarrhea. It may also result in hemolytic and megaloblastic anemias. Doses of folacin that greatly exceed the RDA may obscure a serious condition called pernicious anemia.