BUL 1101

Vitamins

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Introduction

VITAMINS ARE MICRONUTRIENTS, which are nutrients that contribute zero calories to our diet and that we need to consume in small amounts (a.k.a. micro). Nevertheless, they are very important to our bodies, specifically because they convert the food we eat into the energy we need every day, and have important functions in blood clotting, immune response, and nervous system operations. When we are vitamin-deficient, we can develop troubling health conditions and diseases, like rickets or scurvy. This is why it is important to eat a variety of foods rich in vitamins. Two classifications of vitamins determine their absorption and storage within our bodies: water soluble and fat soluble. Table 1 lists the thirteen essential vitamins we need daily, including their classification, function, and food sources.

Fat-Soluble Vitamins

The fat-soluble vitamins (vitamins A, D, E, and K) require fat for absorption and storage. Unlike water-soluble vitamins, fat-soluble vitamins can be stored short-term in our bodies, but consistent intake of these nutrients is still required to maintain our nutritional health. Vitamins A and K are found in foods that we commonly eat and most people in the United States consume adequate amounts of these nutrients in their typical diet. We get vitamin A from animal products, and red and orange fruits and vegetables and vitamin K from leafy green vegetables and cruciferous vegetables. In contrast, vitamin E is found in vegetable oils; however, Americans do not typically meet daily recommendations.

Vitamin D is found in few foods naturally; even milk is artificially fortified with it. Yet our bodies can produce all the vitamin D we need during the summer from adequate, unprotected sun exposure. For those living above the 37th parallel (Figure 1), spending about fifteen minutes outside without sunscreen and with bare skin exposed around noon from April to September helps meet the daily allowance. Nevertheless, those living in this region should take a vitamin D supplement with at least 1,000 IU (25 µg) or more daily, depending on their primary health care provider's

Table 1. The thirteen vitamins needed by the human body.

Vitamin	Classification	Function	Food Source
Thiamin (B1)	Water Soluble	Breaks down carbohydrates	Pork, nuts, lentils, legumes, seeds
Riboflavin (B2)	Water Soluble	Breaks down protein, fat, and carbohydrates	Dairy, eggs, meat, salmon
Niacin (B3)	Water Soluble	Breaks down protein, carbohydrates, and fat; makes and repairs genetic material	Vegetables, meats, fish, seeds, legumes, rice
Pantothenic Acid (B5)	Water Soluble	Breaks down nutrients, synthesizes new bodily tissues	Very common in foods: meats and fish, eggs, milk, vegetables, and grains
B6 (Pyridoxine)	Water Soluble	Maintains nervous system functions and the immune function	Meat and dairy are the main sources, but also in oats, wheat germ
Biotin (B7)	Water Soluble	Breaks down protein, fat, and carbohydrates	Egg yolk, nuts, seeds, legumes, vegetables, and yeast
Folate/Folic Acid (B9)	Water Soluble	Forms red blood cells; prevents neural tube defects during pregnancy	Fortified grain products, dark leafy greens, and legumes
B12 (Cobalamin)	Water Soluble	Makes blood and nervous system cells; makes genetic material	Red meat, other animal products
Choline	Water Soluble	Regulates mood, memory, and muscle control	Eggs, cruciferous vegetables, and grains
Vitamin C	Water Soluble	An antioxidant; supports the immune function	Citrus fruit, strawberries, and red, orange, and yellow bell pepper
Vitamin A	Fat Soluble	Supports vision	Red and orange vegetables, fish, meat
Vitamin D	Fat Soluble	Strengthens bone health; supports the immune function	Milk, unprotected sun exposure, and mushrooms
Vitamin E	Fat Soluble	An antioxidant	Vegetable oils
Vitamin K	Fat Soluble	Enables blood clotting	Leafy greens, cruciferous vegetables

recommendation. The ability to make vitamin D varies depending on many factors. Individuals over sixty-five years of age, those with darker skin tones, those who choose to wear clothing that covers most of their body, or those who wear sunscreen daily may be at risk of low vitamin D and may benefit from year-round supplementation.

Water-Soluble Vitamins

Water-soluble vitamins (i.e., thiamin, riboflavin, niacin, pantothenic acid, B6, biotin, folate, B12, vitamin C, and choline) dissolve in water, so they cannot be stored in our bodies like fat-soluble vitamins. What our body doesn't absorb and utilize is quickly eliminated in our urine. Therefore, we must consume them on a regular basis. Because these types of vitamins are found in a variety of foods, maintain a diet rich in low-fat dairy, fish and seafood, fortified whole grains, a variety of meat and protein sources, along with plenty of fruits and vegetables to meet your needs. Vitamin deficiencies in the United States are rare, although individuals with certain factors, like pregnancy or breastfeeding or those who are of an older age may be at higher risk. Many water-soluble vitamins play vital roles in the breakdown of macronutrients (see University of Idaho Extension bulletin, *Nutrition Basics: Macronutrients* [BUL 1100]) like protein, fat, and carbohydrate. Therefore, to get the most out of the foods we eat and to have energy for the day, we must consume adequate amounts of the water-soluble vitamins.

Getting Enough Vitamins from Food

The Dietary Reference Intakes (DRIs) are a set of reference values based on sex, age, and life stage (i.e., pregnancy and lactation) for nutrients that were developed by the National Academy of Medicine. The DRIs give us an idea of how much of each vitamin we need every day. However, the average consumer does not need to keep track of their intake of each specific

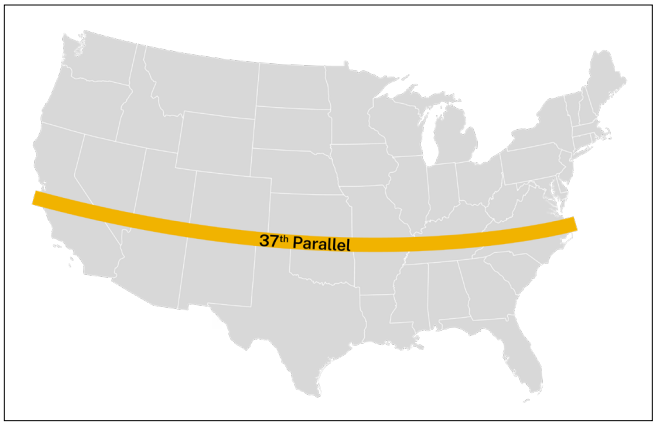

Figure 1. The 37th parallel. Individuals living above the gold line can only produce vitamin D from April to September.

vitamin. Vitamins are found in a variety of foods and by eating a balanced diet most people can meet their needs. Even so, a few strategies have been developed to help guide us to consume a diet rich in vitamins. The 5-a-Day campaign encourages the consumption of five one-half cup servings of fruits and vegetables per day and the MyPlate campaign suggests filling half your plate with vegetables and fruit at each meal. These campaigns were developed with the goal of informing people about the importance of consuming a diet that meets all of your nutritional needs. By choosing a dietary pattern similar to what 5-a-Day or MyPlate suggest, you can easily meet your vitamin needs, except for vitamin D in the winter, which requires taking a supplement. However, some individuals may benefit from taking a supplement no matter the season. For example, pregnancy and lactation create very high nutritional needs in an individual. As a result, it is best to consume a prenatal supplement before, during, and after pregnancy and while lactating. Additionally, those following a dietary pattern that excludes meat products may struggle to meet their B12 needs and benefit from taking a B12 supplement.

Summary

Although vitamins are nutrients that humans need in small amounts, they greatly influence our bodies and our health. Fortunately, many of the foods we eat are rich in vitamins. Eating a variety of them, particularly foods like fruits and vegetables, ensures that you will get enough vitamins every day.

Further Reading

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