

The ABCs of Nutrition

Will a vegetarian diet provide all the vitamins and minerals you need?

Adapted from an article in *Vibrant Life*, Special Edition on Going Meatless by Patricia K. Johnston, Dr.P.H., M.S., R.D. (used by permission).

Vitamins

Riboflavin, niacin, pantothenic acid, cobalamin, folate - exotic words? No, simply B vitamins. And in nutrition, B1 isn't a supersonic bomber, it's thiamine, also a B vitamin. Of course, there's A, C, D, E, K, biotin, pyridoxine, and a host of minerals. But what about vegetarian diets? Do they provide all the vitamins and minerals you need?

First, let's consider what vitamins are and what they do. The dictionary defines them as organic substances; that is, they contain carbon. They also contain hydrogen, oxygen, and sometimes nitrogen and sulfur. Vitamins are needed in minute quantities to help control the metabolic processes that go on in our bodies. They do not, however, provide energy, as people often mistakenly think. They do help to change the energy in the food we eat to forms the body can use, and they help maintain our vision and our nervous tissue, and protect against damage from oxygen.

Water-soluble vitamins are the eight B vitamins and vitamin C, and fat-soluble vitamins are A, D, E, and K. It is often thought that water-soluble vitamins must be eaten every day, but the body stores enough of some to last for a few weeks and others for months or longer. It is important, though, that the average intake over a week or two provides all the vitamins.

The body contains even larger stores of fat-soluble vitamins than water-soluble. Fat-soluble vitamins can be toxic. And just as children are especially susceptible to inadequate intake of nutrients, they are especially susceptible to overdoses. Supplements should be used only under a physician's care. However, toxicity is unlikely to occur from the diet.

Minerals

Minerals work with vitamins to control the various metabolic processes in the body. They provide the structural support in our skeleton and form the enamel of our teeth. They help our blood to clot, carry oxygen to all our cells, regulate our heart beat, and maintain proper fluid balance. Like vitamins, minerals are divided into two categories: major and trace minerals. The major minerals are needed in larger amounts and include calcium, phosphorus, and magnesium. Trace minerals are needed in much smaller amounts. Some minerals, essential in very small amounts, are toxic at higher intakes.

Nutrient sources

The foods we eat carry the nutrients we need. Since no one food contains all the essential nutrients, we need to eat a variety of foods. In general, the same kinds of foods contain similar

nutrients. So if a group of foods is eliminated from the diet, care must be taken to ensure that the nutrients usually found in that food group are obtained from other sources. The potential for deficiency becomes greater as more foods are excluded from the diet. This is of special interest to vegetarians who do not use various animal foods products.

Vitamin B12 : Vitamin B12 (cobalamin) is of special interest in a vegetarian diet because the practical sources for this vitamin are animal products, such as meat, fish, poultry, eggs, milk, and other dairy products. B12 is manufactured by bacteria. The process occurs in the digestive tract of cud-chewing animals. B12 can then be absorbed and incorporated into their tissues or milk. The vitamin is not made by any plants.

Lacto-ovo- or lacto-vegetarians obtain adequate amounts of B12 from milk and dairy products and / or eggs. A total vegetarian diet would not contain this vitamin unless it had been added to a particular food product, and thus total vegetarians could develop a deficiency.

Labels on some fermented soy products, such as tempeh, state that they are good sources of this vitamin. And spirulina is touted by health food stores as being a rich source. However, these claims are misleading, and such products are not reliable sources of vitamin B12.

Confusion persists because the common method for analyzing vitamin B12 content does not distinguish between forms of the vitamin that are active for humans and those that are active for bacteria but not for humans. The latter forms are called B12 analogues, whereas the form that is active in humans is called cobalamin. If a label simply says "vitamin B12" substantial amounts may be the analogue form.

Importance for infants and seniors

The status of this vitamin is of particular concern because a deficiency can mean irreversible neurological damage. Some years ago several cases of vitamin B12 deficiency in infants were reported in the medical literature. The infants were all exclusively breast-fed by mothers who used no animal products. They developed normally for several months and then began to regress. Their activity progressively decreased, as did their socialization. They lost muscle control and became increasingly irritable and fretful. Two became comatose.

In most cases there was rapid improvement after the babies were given vitamin B12 . However, in at least one case recovery was not complete. The baby was in a coma at 9 months of age. Although he improved, he still could not walk at 17 months. At age 14 years he was physically strong and healthy, but had borderline intelligence and needed help with schoolwork.

Although these certainly are rare cases, and thankfully so, they underscore the need for infants, young children and pregnant and lactating women to get adequate vitamin B12 . It's important for older persons, as well.

True, vitamin B12 deficiency is rare, even among people who eat no animal food. Ordinarily the body has considerable stores of this vitamin, enough to last five years or more. The body also has

an effective system for reusing it. So it may take 20 years or more for a vegan to develop evidence of a deficiency.

However, if the gastrointestinal tract is not functioning properly, it can take only three years for the deficiency to develop. As we age, gastrointestinal secretions that are necessary for the absorption and reabsorption of vitamin B12 diminish. Therefore, it is important for older vegans to be concerned about their vitamin B12 intake.

Bacteria in the colon produce large quantities of B12 but the body can't absorb it from the colon. The site where B12 is absorbed is in the lower part of the small intestine, above the colon.

Some B12 is produced in the small intestine, but does not appear to be sufficient to meet requirements, and total vegetarians should not rely on it as a source of this vitamin.

Seaweed also may contain some vitamin B12 from contact with adhering plankton, but this source is also unreliable. Vegans will need to get vitamin B12 from fortified foods or a supplement.

Calcium and vitamin D

Two other nutrients of concern to those who use no milk or dairy products are calcium and vitamin D. Several studies have found a low intake of these nutrients in the diets of young vegan children. There have also been reports of rickets in children on restrictive diets who have little exposure to sunshine.

Vitamin D increases the absorption of calcium, and both are needed for the mineralization of bones. Other factors associated with vegan diets that may affect the availability of calcium include high intake of fiber and phytic acid, both of which can increase calcium absorption.

On the other hand, total vegetarians are often more physically active, and this appears to improve bone strength. They also are more likely to avoid calcium-wasting medications, caffeine and cigarettes. The lower protein intake of vegetarian diets is also beneficial, whereas high intake of protein causes a loss of calcium.

However, concern has been expressed with regard to bone density in total vegetarians. Young females especially should be encouraged to consume an adequate amount of calcium.

For the total vegetarian, calcium sources include tofu, dark-green leafy vegetables, blackstrap molasses, cereals, legumes, and nuts. None of these foods is as concentrated a source as milk, and it is strongly recommended that a fortified soy milk beverage be used. This is especially true for vegan children. Many new soy beverages are on the market, but many of them are not fortified appropriately. Be sure to read the label. They should have added calcium, vitamin D, and vitamin B12 .

Iron

Iron is of special concern in the diets of women of child-bearing age, adolescents, and young children. Intake is often lower than optimal. Iron deficiency can affect a child's ability to learn, as well as pregnancy outcome.

Two forms of iron are found in the diets of most people. Heme iron comes from animal tissues and is highly available. The less well absorbed nonheme iron is found in plant foods.

The absorption of nonheme iron is affected by various dietary factors. For instance, fiber, phytates, and phosphates commonly found in plant foods, and the tannins in tea, inhibit its absorption. In contrast, vitamin C-containing foods increase its absorption when eaten at the same meal. Thus, it is very important for vegetarians to include a vitamin C-containing food at every meal. This will help to increase the availability of iron and prevent iron-deficiency anemia.

Sources of iron include whole-grain and enriched breads and cereals, seeds, nuts, legumes, blackstrap molasses, raisins, prune juice, green leafy vegetables, tofu, and brewer's yeast.

Zinc

Most of the zinc consumed by Americans comes from animal products. In addition, the absorption of zinc is affected by various plant food components, such as fiber and phytate. It is not uncommon to hear concern expressed with regard to zinc adequacy in vegetarians, especially vegans.

It appears the body adapts to higher intakes of fiber, and thus zinc status may not be affected as much as might be expected.

It is important to include a variety of good sources of this important mineral every day. These include nuts, legumes, sunflower and pumpkin seeds, wheat germ, whole-grain yeast breads, and whole-grain cereals. For lacto-vegetarians, milk and milk products are a good source.

Summary

A lacto- or lacto-ovo-vegetarian diet can provide the needed nutrients. Greater care must be taken when milk and eggs are not included in the diet. Attention must be given to those nutrients that are found in lesser amounts or in a less available form from plant foods. Legumes should be included on a daily basis because of the contribution they make of many vitamins and minerals. A source of vitamin B12 must be assured.

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