

## Position of The American Dietetic Association: Vegetarian diets—technical support paper

The attention focused today on personal health habits is unprecedented, as more and more Americans adopt health-promoting life-styles that include alterations in diet and exercise patterns. Simultaneously, there has been a marked rise in interest in vegetarian diets. A considerable body of scientific data suggests positive relationships between vegetarian life-styles and risk reduction for several chronic degenerative diseases and conditions, such as obesity, coronary artery disease, hypertension, diabetes mellitus, colon cancer, and others. The high incidence of such diseases in industrialized nations, as compared with other cultures, warrants special attention to diet and other factors in life-styles that may vary between vegetarians and nonvegetarians.

*It is the position of The American Dietetic Association that vegetarian diets are healthful and nutritionally adequate when appropriately planned.*

Both vegetarian and nonvegetarian diets have the potential to be either beneficial or detrimental to health. Sound nutrition planning may result in risk reduction and control of some diseases and conditions by dietary measures, whereas poorly planned or haphazard diets increase the likelihood of diet-related disorders of deficiency or excess. However, in addition to the possible health benefits of some vegetarian diets, consideration may also be given to ecological, economical, and philosophical or ethical reasons for adopting such a diet. It may be easier, as well as more acceptable, for some individuals to meet the Dietary Guidelines for Americans by following a vegetarian diet rather than a nonvegetarian diet (1).

### **Vegetarianism in perspective**

There is no single vegetarian eating pattern. From the standpoint of nutritional health, vegetarian diets are distinguished from one another by (a) the extent to which the foods included vary, (b) the degree to which the diets are planned to correspond to the findings of nutritional sciences, and (c) the health attitudes and practices that are associated with the diets.

Vegetarian diets differ in the extent to which they avoid animal products. Veganism, or total vegetarianism, completely excludes meat, fish, fowl, eggs, and dairy products. Lacto-vegetarianism is the avoidance of meat, fish, fowl and eggs, whereas ovo-lacto-vegetarianism involves avoidance of only meat, fish, or fowl. Semi-vegetarian patterns allow limited amounts of most animal foods.

In addition to proscriptions on animal foods, some vegetarian diets also incorporate restrictions on other foods and beverages, such as honey, alcohol, caffeinated beverages, highly processed

foods, and foods that are grown or processed nonorganically or with certain additives and preservatives. Finally, some patterns include the addition of special foods or practices that are thought to have unique health promotive or curative properties. Included are vitamin-mineral supplements, dietary fiber and essential fatty acid supplements, health foods, herbal teas, and practices such as periodic fasting.

Since vegetarianism is a term that encompasses such a wide variety of eating patterns, nutrition assessment of such diets is difficult without information about specific food avoidances and health-related attitudes and practices. The differences may have a significant impact on nutritional status (2).

Studies of vegetarians indicate that this population generally has lower mortality rates from several chronic degenerative diseases than do nonvegetarians. It is likely that the effects are due not to diet alone but also to a healthy life-style, including desirable weight, regular physical activity, and abstinence from smoking, alcohol, and illicit drugs, with adequate health monitoring (3-6).

Even though the health benefits of a vegetarian diet make it attractive from a nutrition standpoint, this does not preclude the possibility of obtaining similar health benefits from a prudent nonvegetarian diet if it can be planned in accordance with the Dietary Guidelines for Americans. However, in addition to health aspects, considerations that may lead to the adoption of a vegetarian diet include: ecological implications of eating low on the food chain with regard to preservation of the environment or for the perceived solution to world hunger problems by decreasing the demand on the world's food resources; economic reasons, since diets low in animal proteins are typically less expensive than meat-based diets; and philosophical or ethical reasons, which include animal rights issues and attitudes toward violence. Still other individuals are motivated by religious beliefs.

### **Implications for health promotion**

Mortality from coronary artery disease is lower in vegetarians than in nonvegetarians (7,8). Total serum cholesterol and LDL cholesterol levels are usually lower, while HDL cholesterol and triglyceride levels vary, depending on the type of vegetarian diet that is followed (9-12). Vegetarian diets that are typically very low in fat and cholesterol may decrease levels of apoproteins A, B, and E (12). Platelet composition and possible platelet functions may vary, and plasma viscosity may be decreased (13). Such effects may be attributed to the vegetarian's lower intake of total fat, saturated fat, and cholesterol, along with lower weight, increased physical activity, and abstinence from smoking (10, 14,15). Vegetarians generally have lower blood pressures and

lower rates of Type II diabetes than do nonvegetarians, which may decrease the risk of coronary artery disease in the vegetarian population.

Vegetarians of the Seventh-Day Adventists faith have lower rates of mortality from colon cancer than does the general population (4). That may be due to dietary differences which include increased fiber intake, decreased intake of total fat, cholesterol, and caffeine, increased intakes of fruits and vegetables, and, in lacto-vegetarians, increased intakes of calcium (16). Although it is still speculative, the dietary differences, especially in vegans, may produce physiological changes that may inhibit the causal chain for colon cancer (16,17). Lung cancer rates are lower in many types of vegetarians because they typically do not smoke or, possibly, because of their increased intake of beta carotene or other constituents of fruits and vegetables that may also lower lung cancer risk (18). Preliminary evidence suggests that vegetarians may be at lower risk for breast cancer, but further study is indicated (19).

Obesity is a complicating condition exacerbating many diseases. Vegetarians, especially vegans, have weights that are closer to desirable weights than do nonvegetarians (20). Several factors may be involved, including moderation in energy intakes, increased physical activity, and better regulation of food intake. The high-carbohydrate, low-fat vegetarian diet, in combination with exercise, may decrease the risk of obesity (21).

Vegetarians are at lower risk for noninsulin-dependent diabetes, partly because they are leaner than nonvegetarians (22,23). The vegetarians' high intake of complex carbohydrates, with its relatively high fiber content, improves carbohydrate metabolism, lowering basal glucose levels (24,25).

Vegetarians have lower rates of hypertension than do nonvegetarians, which may be due to vegetarians' relative leanness (26,27). Other aspects of life-style may also be involved (28), such as dietary habits, increased physical activity, and abstinence from smoking.

Finally, vegetarians have lower rates of osteoporosis, kidney stones, gallstones, and diverticular disease (29-31). Studies documenting these benefits, however, are inconclusive at this time, and reasons may be related to aspects of life-style other than diet.

### **Nutrition considerations**

The body's need for essential amino acids can be met by consumption of animal or plant sources of protein since, after absorption, amino acids from exogenous and endogenous sources combine in the body's protein pool (32). Plant foods contain less of the essential amino acids than do equivalent quantities of animal food, but a plant-based diet provides adequate amounts of amino acids when a varied diet is consumed on a daily basis. A mixture of proteins from unrefined grains, legumes, seeds, nuts, and vegetables will complement one another in their amino acid profiles so that deficits in one are made up by another.

Intakes of different types of protein that complement one another should be eaten over the course of the day. However, since endogenous sources of amino acids are also available, it is not necessary that complementation of amino acid profiles be precise and at exactly the same meal, as the recently popular "combined proteins theory" suggested. This theory urged conscious combining of proteins at every meal with the caveat that malnutrition would ensue if this was not done within a strict time interval (33).

Although vegetarian diets usually meet or exceed requirements for protein, they typically provide less protein than nonvegetarian diets. This lower protein intake may be beneficial, however, and may be associated with a lower risk of

osteoporosis in vegetarians and improved kidney function in individuals with prior kidney damage (34,35). Further, a lower protein intake generally translates into a lower fat diet with its inherent advantages, since foods high in protein are frequently also high in fat.

Plant carbohydrates are accompanied by liberal amounts of dietary fiber, which has been shown to be important in the prevention and treatment of disease. Foods derived from animal sources contain no fiber. Complex carbohydrates from plants also improve glucose tolerance, as previously noted.

Vegetarian diets that are low in animal foods are typically lower than nonvegetarian diets in total fat, saturated fat, and cholesterol, an important factor in risk reduction for heart disease and some forms of cancer. The ratio of polyunsaturated and monounsaturated fats to saturated fats is also more favorable in a largely plant-based diet.

Vegetarians and nonvegetarians alike may have difficulty meeting recommendations for iron. Absorption of dietary iron is enhanced by concurrent consumption of ascorbic acid or animal foods; it is inhibited by the intake of tea, fiber, and phytates (36). Western vegetarians generally have better iron status than those in developing countries. The former have a relatively high intake of iron from plant foods, such as dark green leafy vegetables, iron-fortified cereals, and whole grains. They may take supplements of ascorbic acid or iron and have a greater intake of ascorbic acid from plant foods. In contrast, vegetarians in developing countries consume less ascorbic acid and animal protein, rely on low-iron food staples, and consume more fiber and tea than do Westerners (37).

The requirement for vitamin B-12 is minute, but there is no vitamin B-12 in anything that grows from the soil. It is, however, contained in all animal foods; hence, a diet that includes animal foods, such as dairy products, is unlikely to be deficient in vitamin B-12. Bacteria produce vitamin B-12 in the human gut, but it appears to be produced beyond the ileum, the site of absorption in the intestine. Ninety-five percent of what is produced is actually inactive vitamin B-12 analogs. The need for vitamin B-12 is very small, and lack of intrinsic factor is a more common cause of vitamin B-12 deficiency than lack of vitamin B-12 in the diet.

Nevertheless, adequate vitamin B-12 intake is a legitimate concern for Western vegans. In countries where sanitary conditions are poor, contamination of foods with microbes and organisms that produce the vitamin may contribute all that is needed. In Western countries, however, where sanitary practices are better, the risk of vitamin B-12 deficiency is greater. Vegans must include a reliable source of vitamin B-12 in their diets or be at risk of eventually developing a deficiency.

However, food labeling of vitamin B-12 can be misleading. The vitamin B-12 content of most foods in the United States has been determined by use of a microbiological assay which measures not only physiologically active forms of vitamin B-12 for human subjects but also inactive vitamin B-12 analogs. By microbiological assay, as much as 80% to 94% of the so-called vitamin B-12 in fermented plant foods, such as tempeh, and in other plant foods may be inactive vitamin B-12 analogs.

Some of the vitamin B-12 analogs also compete with active forms of vitamin B-12 for absorption. Thus, vegans should supplement their diets with a source of vitamin B-12 such as a cobalamin supplement or select appropriately fortified foods that meet the Recommended Dietary Allowances to ensure an adequate intake of the active form of the nutrient. Further research on vitamin B-12 is needed, as there is a great deal that is not clearly understood regarding available sources of vitamin B-12 for vegans.

Calcium absorption appears to be inhibited by such plant

constituents as phytic acid, oxalic acid, and fiber, but this effect may not be significant. Calcium deficiency in vegetarians is rare, and there is little evidence to show that low intakes of calcium give rise to major health problems among the vegetarian population. One recent study has shown that vegetarians absorb and retain more calcium from foods than do nonvegetarians (38). Other studies cite lower rates of osteoporosis in vegetarians than in nonvegetarians (29).

Reliance on sunshine alone, particularly in northern climates or in cultures where most of the body is concealed in clothing, may not provide all of the vitamin D needed to protect children against rickets (39). For those who do not use vitamin D-fortified milk products, a vitamin D supplement may be necessary, especially for dark-skinned individuals and for infants whose only source of vitamin D is breast milk after 4 to 6 months of age.

### Groups with special needs

Those whose nutrient needs are especially high because of growth, lactation, or recovery from illness will find it especially helpful to consult a registered dietitian or other qualified nutrition professional for expert help in diet planning. Infants and children who consume well-planned vegetarian diets including milk products or eggs can generally meet all of their nutritional requirements for growth. Those who follow vegan or vegan-like diets which include no animal products can be healthy, but more care must be taken to ensure adequacy. Vitamin D and iron supplements, in addition to vitamin B-12 at levels sufficient to meet the Recommended Dietary Allowances, may need to be provided (40).

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## Vegetarians are at lower risk for noninsulin-dependent diabetes and have lower rates of hypertension, osteoporosis, kidney stones, gallstones, and diverticular disease than nonvegetarians

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Vegan diets tend to be high in bulk, which makes it more challenging to meet energy needs, especially for infants, children, and adolescents (41). Further, care must be taken to obtain enough vitamins D and B-12. A properly fortified soy product may be helpful. Both vegetarians and nonvegetarians whose infants are premature or are breast fed exclusively beyond 4 to 6 months of age should provide supplements of vitamin D and iron from birth or at least by 4 to 6 months, as medical guidance suggests. The guidelines of the American Academy of Pediatrics for supplementation of infants are helpful (42).

Well-planned vegetarian diets are adequate for pregnant and lactating women. With both vegetarian and nonvegetarian diets, iron and folate supplements are usually necessary during pregnancy, although vegetarians frequently have greater intakes of those nutrients than do nonvegetarians.

### Meal planning

In planning vegetarian diets of any type, one should choose a wide variety of foods, which may include fruits, vegetables,

whole grain food products, nuts, seeds, legumes, low-fat dairy products or fortified soy substitutes, and a limited number of eggs. Additionally, the following recommendations are made (43,44):

- Keep the intake of low nutrient-dense foods, such as sweets and fatty foods, to a minimum.
- Choose whole or unrefined grain products whenever possible, instead of refined products.
- Use a variety of fruits and vegetables, including a good food source of vitamin C to enhance iron absorption.
- If milk products are consumed, use low-fat varieties.
- Limit intake of eggs to two to three yolks per week to ensure that cholesterol intakes are not excessive.
- For vegans, use a properly fortified food source of vitamin B-12, such as fortified soy milks or breakfast cereals, or take a cobalamin supplement.
- For infants and children, ensure adequate intakes of iron, vitamin D, and energy.
- Consult a registered dietitian or other qualified nutrition professional.

The Dietary Guidelines for Americans recommend a reduction in fat intake and an increased consumption of fruits, vegetables, and whole grains. Well-planned vegetarian diets effectively meet these guidelines and the Recommended Dietary Allowances and can be confidently embraced as a healthy dietary alternative. However, vegetarians, particularly total vegetarians, living in a nonvegetarian society such as the United States, must be aware that foods most readily available in this culture may not be those which are most appropriate for their eating patterns; thus, vegetarians must pay special attention to ensuring nutrient adequacy. Additionally, both vegetarians and nonvegetarians must obtain adequate health monitoring throughout the life cycle.

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