Modified Food Guide Pyramid for People over Seventy Years of Age\textsuperscript{1,2}

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The second edition of \textit{The Dietary Guidelines for Americans} was published in 1990 as a joint effort of the U.S. Department of Agriculture and the U.S. Department of Health and Human Services Dietary Guidelines for Americans 1990. Based on the Dietary Guidelines, a Food Guide Pyramid was constructed for educational purposes (The Food Guide Pyramid 1992). The principles underlying the Dietary Guidelines and Food Guide Pyramid hold for Americans of all ages above 2 y. However, a modification of the recommendations within the Food Guide Pyramid seems appropriate for use in educating healthy, active people above the age of 70 y to optimize their nutrient intake patterns consistent with the changes in nutrient and energy needs of older individual (Fig. 1).

This elderly group is particularly vulnerable to compromised nutrient intake because with advancing age, energy needs decrease, necessitating a decrease in food intake. Among people over the age of 70 y surveyed in NHANES III, about 40\% consumed below $2/3$ of the RDA for energy (NHANES III people over the age of 70 y surveyed in NHANES III, about needs decrease, necessitating a decrease in food intake. Among people over the age of 70 y surveyed in NHANES III, about 40\% consumed below $2/3$ of the RDA for energy (NHANES III 1988–94). Thus, for elderly people, the Food Guide Pyramid should highlight specific selections within each food group category to emphasize foods with a high ratio of nutrients to energy (nutrient density) to ensure adequate nutrient intakes, and should be narrowed to reflect lowered energy needs.

This paper presents a suggested refinement of the Food Guide Pyramid to be applied to individuals who are 70 y old and older, and who are relatively healthy and active and wish to remain so. These individuals can generally be characterized as living independently, being free from major health disorders that would limit food access or intake, and participating in a variety of activities outside their homes. Given the shifting demographics in the United States, this is a growing segment of the population which has historically been underrepresented in previous recommendations for different age subgroups. Additionally, this group should be distinguished from the very elderly people who are not well and for whom different dietary considerations, such as energy density, arise.

This modified Food Guide Pyramid which will be referred to as the Modified Food Pyramid for 70+ Adults (Fig. 1) continues to be based on the principles of The Dietary Guidelines and those of other health organizations: plenty of variety; diets high in grain products, vegetables and fruits; diets low in saturated fatty acids and cholesterol; low to moderate use of sugar, salt and alcohol; and physical activity in balance with energy intake. However, we suggest one addition to the 70+ Food Pyramid: a small supplement flag at the top and symbols for water and fiber. It will be very hard for a person above the age of 70 y to obtain adequate intakes of particular nutrients due to the reduced portion sizes, the reduced number of food servings being ingested and restrictions in food choices secondary to medical conditions (for example, lactose intolerance). The nutrients which are of particular concern in the elderly are calcium, vitamin D and vitamin B-12.

**Nutrient-dense/fortified foods.** Right now, little guidance is provided within each food category of the Food Guide Pyramid regarding specific choices, with the exception of limiting foods high in fat or refined sugar. The importance of choosing a variety of food is emphasized. However, with respect to the elderly, many of whom have energy intakes at or below the minimum of that assumed in the Food Guide Pyramid (1600 kcal or 6.72 MJ), guidance is essential regarding the selection of foods that are high in nutrient density.

Thus, within the bread, cereal, rice and pasta group, choices should be primarily among those that are whole-grain, enriched or preferably fortified, which are particularly important because the bread and cereal group comprises the bulk of the diet in elderly people, some of whom are at risk for malnutrition (Tucker and Rush 1992). In addition to products made with enriched flours and whole grains, breakfast-type cereals that are fortified should be consciously chosen. Recently, the Food and Drug Administration (FDA) issued regulations that require "enriched" cereal grains to be fortified with folic acid at a concentration of 140 \mu g/100 g of cereal grain product. This regulation was directed at eliminating folic-acid preventable birth defects. However, folate fortification may also benefit the elderly by lowering blood homocysteine levels, resulting in a potential reduction in risk of homocysteine-related cardiovascular disease. Higher intakes of folic acid pose a problem for individuals who may have subclinical vitamin B-12 deficiency by precipitating vitamin B-12–related neurologic symptoms. To prevent excessive folate acid intakes, the FDA chose a fortification level of folic acid to prevent the majority of the population (95\%) from consuming greater than 1.0 mg/d of total folate. At this level of folate fortification, it is estimated that only 6\% of the population would consume greater than 1.0 mg total folate per day (Tucker et al. 1996).

Within the vegetable group, choices should be among those which are deeply colored. Dark green, orange or yellow fresh, frozen or canned vegetables contribute vitamin C, folic acid, vitamin A (in the form of provitamin A carotenoids) and a substantial amount of dietary fiber. Cruciferous vegetables,
including beets, kale, cabbage and broccoli, also contribute antioxidant phytochemicals such as indoles, flavones and isothiocyanates. Similarly, within the fruit group, choices of fresh, canned or dried products should be yellow, orange or red in color. For fruits and vegetables, emphasis should be placed on consuming the whole food, rather than a reliance on juice, in order to supply adequate fiber intake (see below).

Within the milk, yogurt and cheese group, emphasis should be placed on low-fat dairy products, given the absence of evidence that old age obviates the need for restrictions in saturated fat and cholesterol intake. The ever-expanding availability of lactose-free foods, live culture fermented dairy products and lower fat cheeses, which are concentrated sources of protein, calcium, vitamin D (milk only) and riboflavin, should enable the consumption of the nutrient-rich dairy group by most elderly people.

Lastly, within the meat, poultry, fish, dry beans, egg and nuts group, emphasis should be placed on variety, with individual choices made according to preference, availability, ease of preparation, chewability and cost affordability. Lean cuts of meat should be chosen. Fish represents a good selection, since it provides high-quality protein and (n-3) fatty acids. Also, suggestive epidemiologic data show that fish in the diet may lower the risk of developing cardiovascular disease when eaten on at least a weekly basis (Daviglus et al. 1997). Noteably, bean, grain and vegetable main dishes provide high-quality protein, add fiber to the diet and, as with fish, when substituted for meat, help to minimize saturated fat and cholesterol intake.

**Fats and sugar.** The elderly person’s diet should be high in nutrient-dense foods, but relatively low in high-fat foods, due to diminished energy needs. Further, no evidence exists that the general recommendation for the U.S. population to limit fat intake to 30% of energy, saturated fat to 10% or less of energy needs will apply to the elderly, primarily for prevention of constipation, diverticulosis and diverticulitis (Brody 1980). In addition, diets high in fiber are associated with lower cholesterol levels, as well as a lower incidence of cardiovascular disease and cancer (Kromhout et al. 1982, Rimm et al. 1996).

The mean dietary fiber intake in elderly males and females (70 y and older) in NHANES III was 14–16 g/d (NHANES III 1988–94). However, generally 20 g/d or above is needed to provide health benefits (Dietary Guidelines for Americans 1990). Food choices that should be emphasized in the elderly are: whole-grain breads rather than breads made with refined flour, brown rice rather than white rice, whole fruits rather than juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast. Most elderly can eat more fiber than a reliance on juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast. Most elderly can eat more fiber than juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast. Most elderly can eat more fiber than juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast. Most elderly can eat more fiber than juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast. Most elderly can eat more fiber than juice, legumes instead of meat at least twice a week, cooked vegetables, fresh salad, and most importantly, the choice of a high-fiber cereal for breakfast.

**Fluids.** The fluid needs of an elderly person can be greatly influenced by the amount of physical activity the individual is doing, the medications being taken, renal function and ambient temperature. In the elderly person, fluid intake is more...
important to emphasize than in younger individuals, since aging causes compromised homeostatic mechanisms (for example, decreased thirst sensation) (Phillips et al. 1984). In addition, lack of fluid can be a major contributory factor in constipation. Elderly people should drink two quarts (about two liters) of fluid per day (Water & Electrolytes, Recommended Dietary Allowances, 1989). Alcohol should not be calculated as contributing to fluid intake due to its diuretic effect. Likewise, coffee and tea cannot be relied on as major contributors of fluid for similar reasons.

**Supplements.** Although primary emphasis should be placed on the importance of following this 70+ Food Pyramid to maintain health among elderly people, a case for nutritional supplements can be made, at least for specific nutrients: calcium, vitamin D and vitamin B-12. The recommendation for adequate vitamin D intake was raised recently from 200 to 600 IU and for calcium from 800 to 1200–1400 mg/d (Dietary Reference Intakes 1997). Such levels of calcium can be obtained by drinking or eating the equivalent of three servings of calcium-rich dairy products [e.g. 8 oz. (240 mL) milk] per day. Eight ounces (240 mL) of calcium fortified orange juice can be substituted for one serving of milk to help obtain an adequate calcium intake. However, neither cheese, yogurt nor calcium-fortified orange juice contains vitamin D. Many elderly people are not milk drinkers due to lactose intolerance, perceived lactose intolerance, or thinking of milk as a child’s food. Limited sun exposure, due to limited access or a northern climate, can minimize endogenous vitamin D synthesis. Thus, in order to obtain adequate amounts of calcium and vitamin D in the 70+ age group, supplementation may be necessary.

Food-bound vitamin B-12 is not absorbed efficiently in many elderly people due to atrophic gastritis, which is estimated to affect 10–30% of the U.S. population over 60 y (Hurwitz et al. 1997, Krasinski et al. 1986). In individuals with atrophic gastritis, vitamin B-12 cannot be dissociated from food protein due to lack of adequate acid-pepsin digestion (Carmel 1994). Thus, vitamin B-12 is not freed to bind to intrinsic factor for eventual absorption. In addition, atrophic gastritis results in bacterial colonization of the upper gastrointestinal tract, and whatever small amounts of vitamin B-12 are released from food can be taken up by these bacteria (Suter et al. 1991). Therefore, many elderly people will need to ingest vitamin B-12 in a pure (i.e., supplemental) form that is bioavailable, or in the form of vitamin B-12–fortified food products such as breakfast cereals. Other than these nutrients, following the 70+ Food Pyramid should ensure adequate intake of vitamins and minerals without need for supplementation.

**Conclusion.** On the basis of the aforementioned, we suggest that greater emphasis be put on consuming nutrient-dense foods, high-fiber foods and water. Additionally, based on computer models using nutrient-dense foods, we suggest that the number of servings per food category for the 70+ Food Pyramid be modified as follows (Fig. 1): Bread, Cereal, Rice and Pasta Group equal to or greater than 6; Vegetable Group equal to or greater than 3; Fruit Group equal to or greater than 2; Milk, Yogurt and Cheese Group equal to 3; and Meat, Poultry, Fish, Dry Beans, Eggs and Nuts Group equal to or greater than 2. Such a dietary pattern will increase the likelihood that individuals with daily energy intakes of 1200 to 1600 kcal (5–6.7 MJ) will consume 100% of the RDA for protein and all essential micronutrients.

Finally, a flag should be placed on the top of the 70+ Food Pyramid indicating that supplements of calcium, vitamin D and vitamin B-12 are frequently appropriate to promote optimal health. Obviously, these recommendations do not apply to individuals with significant impediments in procuring or consuming whole foods. Continuous monitoring of the elderly is necessary in order to identify changes that negatively impact on food intake.

**LITERATURE CITED**


