
 Nutrition and Health

- 1935 Food Distribution Program established. Social Security Act authorizes grants to States for nutrition services to mothers and children.
- 1936–37 USDA conducts first Nationwide Food Consumption Survey (NFCS).
- 1938 The Food, Drug and Cosmetic (FD&C) Act includes provisions for food standards. FDA nutrition research program established. Social Security Act provides support for role of nutrition in health.
- 1939 Federal Surplus Commodities Corporation initiates experimental Food Stamp Program.
- 1940 National Defense Advisory Commission draws attention to malnutrition in the United States.
- 1941 President Roosevelt calls National Nutrition Conference, with announcement of the first Recommended Dietary Allowances by the Food and Nutrition Board. FDA promulgates standards for enrichment of flour and bread with B-complex vitamins and iron.
- 1946 National School Lunch Program established.
- 1947 Laboratories of Nutrition, Chemistry, and Pathology of the National Institutes of Health incorporated into Experimental Biology and Medicine Institute.
- 1954 Special Milk Program established.
- 1955 Interdepartmental Committee on Nutrition for National Defense established (discontinued 1967).
- 1956 Title VII of the Public Health Service Act authorizes funds to support graduate training in public health nutrition.
- 1958 Food Additives Amendment to FD&C Act prohibits use of a food additive until safety established by manufacturer. Delaney Clause prohibits carcinogenic additives. GRAS (Generally Recognized As Safe) list established.
- 1961 President Kennedy expands the use of surplus food for needy people at home and abroad and announces a new pilot Food Stamp Program.
- 1963 and 1965 Maternal and Child Health and Mental Retardation Planning Amendments to the Social Security Act allow for an expanded number of nutritionists in health care programs.
- 1965 Food Stamp Act passed by Congress. Nationwide Food Consumption Survey collects first data on dietary intake of individuals.

- 1966 Child Nutrition Act passed. School Breakfast Program established. President Johnson outlines Food for Freedom Program, the "war on hunger." Allied Health Professions Personnel Training Act includes support for training of dietitians.
- 1966–70 The Department of Health, Education, and Welfare (DHEW), which later becomes the Department of Health and Human Services (DHHS), sponsors a National Academy of Sciences study, Maternal Nutrition and the Course of Pregnancy, which makes major recommendations related to the role of nutrition in human reproduction.
- 1968 U.S. Senate Select Committee on Nutrition and Human Needs established.
- 1968–70 DHEW sponsors Preschool and Ten-State Nutrition Surveys that report evidence of hunger and malnutrition in poverty groups in the United States.
- 1969 President Nixon calls White House Conference on Food, Nutrition, and Health. Secretary of Agriculture establishes the Food and Nutrition Service to administer Federal food assistance programs.
- 1971–74 The National Center for Health Statistics conducts the first National Health and Nutrition Examination Survey (NHANES) to measure the nutritional status of the U.S. population. This is followed by NHANES II in 1976–80, Hispanic HANES in 1982–84, and NHANES III in 1988.
- 1972 USDA establishes Special Supplementary Food Program for Women, Infants, and Children (WIC). Agriculture and Consumer Protection Act provides price supports to farmers. Amendments to the Older Americans Act of 1965 establish a congregate and home-delivered meals program for older Americans.
- 1974 U.S. Senate Select Committee on Nutrition and Human Needs issues *Guidelines for a National Nutrition Policy*, prepared by the National Nutrition Consortium. Safe Drinking Water Act passed.
- 1975 National Institutes of Health establishes Nutrition Coordinating Committee.
- 1977 U.S. Senate Select Committee on Nutrition and Human Needs issues two editions of *Dietary Goals for the United States*. Food and Agricultural Act and Child Nutrition and National School Lunch Amendments passed.
- 1978 Joint Subcommittee on Human Nutrition Research established in Office of Science and Technology Policy (in 1983 becomes Interagency Committee on Human Nutrition Research under joint direction of USDA and DHHS). DHEW and USDA submit proposal to Congress for National Nutrition Monitoring System.

 Nutrition and Health

- 1979 DHEW establishes Department-wide Nutrition Policy Board and issues *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*.
- 1980 USDA and DHHS jointly issue *Nutrition and Your Health: Dietary Guidelines for Americans*. A second edition follows in 1985. DHHS issues *Promoting Health/Preventing Disease: Objectives for the Nation*, which contains 17 nutrition objectives to be achieved by the year 1990. The Surgeon General's Workshop on Maternal and Infant Health makes recommendations about improving nutrition for these vulnerable groups.
- 1981 DHHS and USDA issue *Joint Implementation Plan for a Comprehensive National Nutrition Monitoring System*, revised in 1987 as the *Operational Plan for the National Nutrition Monitoring System*. The Select Panel for the Promotion of Child Health, created by Public Law 95-626, submits to Congress and the Secretary of DHHS its report, which includes recommendations on nutrition.
- 1984 The Surgeon General's Workshop on Breastfeeding and Human Lactation develops strategies for promoting breastfeeding.
- 1985 USDA initiates Continuing Survey of Food Intakes by Individuals, repeated in 1986.
- 1986 DHHS and USDA issue *Nutrition Monitoring in the United States*, the report of the Joint Nutrition Monitoring Evaluation Committee.
- 1988 DHHS publishes *The Surgeon General's Report on Nutrition and Health*.
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## Appendix C

**Appendix C**  
**Federal Dietary Recommendations for the General Public, 1917–1988**

Year	Agency <sup>b</sup>	Publication	Recommendation <sup>a</sup>							
			Variety	Maintain Ideal Body Weight	Include Starch and Fiber	Limit Sugar	Limit Fat	Limit Choles- terol	Limit Salt	Limit Alcohol
1917	USDA	What the Body Needs— Five Food Groups	+		+	*	*			
1942	USDA	Food for Freedom— Daily Eight	+		+			*		
1943	USDA	National Wartime Nutrition Guide—Basic Seven	+		+			*		
1946	USDA	National Food Guide— Basic Seven	+		+			*		
1946	USDA	Food for Growth— Four Food Groups	+		+					
1958	USDA	Food for Fitness— Four Food Groups	+		+					
1977	U.S. Senate	Dietary Goals for the U.S.		+	+	+	+	+	+	
1979	USDA	Building a Better Diet— Five Food Groups	+	+	+	+	+	+	+	+
1979	DHEW	Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention	+	+	+	+	+	+	+	+

1979	DHEW/NCI	Statement on Diet, Nutrition, and Cancer—Prudent Interim Principles	+	+	+	+			+
1980	USDA/DHHS	Dietary Guidelines for Americans	+	+	+	+	+	+	+
1980	DHHS	National 1990 Nutrition Objectives	+	+	+	+	+	+	+
1984	DHHS/NHLBI	Recommendations for Control of High Blood Pressure		+			+		+
1985	USDA/DHHS	Dietary Guidelines for Americans, 2nd edition	+	+	+	+	+	+	+
1986	DHHS/NCI	Cancer Control Nutrition Objectives for the Nation: 1985–2000		+	+		+		+
1987	DHHS/NHLBI	National Cholesterol Education Program Guidelines	+	+	+		+		+
1988	DHHS/NCI	Dietary Guidelines for Cancer Prevention	+	+	+		+		+

\*Recommended for *inclusion* in the daily diet, as opposed to subsequent recommendations to *limit* intake.

<sup>a</sup>Other recommendations include: increased consumption of foods containing vitamins and minerals (USDA 1917–1958; NCI 1986), increased physical activity (USDA/DHHS 1980, 1985; DHHS 1980), and reduced intake of salt-cured or smoked foods (NCI 1988).

<sup>b</sup>USDA = U.S. Department of Agriculture, U.S. Senate = U.S. Senate Select Committee on Nutrition and Human Needs, DHEW = Department of Health, Education, and Welfare, DHHS = Department of Health and Human Services, NCI = National Cancer Institute, NHLBI = National Heart, Lung, and Blood Institute.



## Appendix D

### Implications for Public Health Policy<sup>a</sup>

#### Coronary Heart Disease

##### Dietary Guidance

###### General Public

High blood cholesterol is one of the three major modifiable risk factors for coronary heart disease (CHD). The principal nutritional factors identified with high blood cholesterol and the development of CHD are dietary fat, particularly saturated fatty acids and cholesterol, and energy imbalance leading to obesity. Other dietary constituents, such as fiber or alcohol, may interact with these factors in ways that are not clearly understood.

The relationship of dietary fat and cholesterol to CHD is supported by extensive and consistent clinical, epidemiologic, metabolic, and animal evidence. These studies strongly indicate that the formation of atherosclerotic lesions in coronary arteries—contributing to the risk for CHD—is increased in proportion to levels of total and LDL (low density lipoprotein) cholesterol in blood, which, in turn, are increased by diets high in total and saturated fat but decreased by diets containing polyunsaturated and/or monounsaturated fat. International epidemiologic comparisons and migration studies have revealed strong associations of fat, especially saturated fat, intake to development of elevated blood cholesterol levels, atherosclerosis, and CHD. Evidence from studies within a given population has been less consistent but points in a similar direction. Dietary intervention trials in men with elevated blood cholesterol levels have demonstrated small but significant proportionate improvements such that each 1 percent reduction in total blood cholesterol is accompanied by about a 1.5 percent reduction in heart disease risk. Intervention to lower elevated blood cholesterol levels has been shown in both human and animal studies to reduce CHD risk and to slow lesion progression. Animal studies have shown lesion regression,

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<sup>a</sup>The material in Appendix D is taken from the concluding sections of each of chapters 2 through 19 of the full Report.

and there is suggestive evidence from some clinical studies that this also occurs in humans.

Taken together, these studies provide strong support for recommendations for an overall considerable decrease in dietary fat intake by the general public from the present level of 37 percent of total caloric intake and decrease in saturated fat from the present level of about 13 percent of total caloric intake.

Although the effect of dietary cholesterol on blood cholesterol is somewhat weaker and more variable among individuals than that for dietary saturated fatty acids, a reduction in the amount of cholesterol consumed by the general public from present average levels of approximately 305 mg/day for women and 440 mg/day for men seems appropriate.

Obesity is associated with such CHD risk factors as elevated LDL and total blood cholesterol, lower HDL (high density lipoprotein) cholesterol, high blood pressure, and diabetes mellitus. It is also a significant independent predictor of CHD, especially in women and in persons under age 50. Thus, current evidence suggests that an overall decrease in the prevalence and severity of overweight in the population, through both a decrease in caloric intake and an increase in caloric expenditure, is advisable on the basis of the relationship of obesity to heart disease risk.

Studies of animal protein, coffee, and sugar have shown variable associations with increased blood lipid levels, but present evidence of their relationship to CHD, if any, is too weak and insufficient to draw implications for changes in the consumption of these substances. Likewise, evidence from some studies that certain components of dietary fiber and omega-3 fatty acids from fish oils reduce blood cholesterol levels and heart disease risk is too preliminary to recommend changes in average intake of these substances. In addition, advice concerning vitamin and mineral supplements on the basis of their relationship to CHD is unwarranted.

#### Special Populations

There is a need to identify those individuals with high cholesterol levels, who are therefore at greatest risk. For individuals whose high total and LDL cholesterol levels warrant treatment, the first line of intervention is diet therapy. The recently released National Cholesterol Education Program guidelines on the treatment of high blood cholesterol in adults recommend that intensive dietary treatment should generally be carried out for at least 6 months. As indicated in this Report, only after that period of time,



and if the cholesterol level remains significantly high, should the addition of drugs to the dietary regimen be considered. Even then, continuation of diet therapy can reduce the need for drugs and thus their risk of side effects and cost. Furthermore, studies in persons with CHD suggest that diets low in fat, saturated fat, and cholesterol can retard the progression of the disease, including recurrent heart attacks, and perhaps induce regression of atherosclerotic lesions. Persons with such high blood cholesterol levels should receive dietary guidance by qualified health professionals.

Adults with total cholesterol levels of 240 mg/dl or above (whose LDL cholesterol levels are also significantly elevated), and those with total cholesterol levels of 200 to 239 mg/dl with CHD or two or more CHD risk factors should begin a program of supervised dietary treatment. The NCEP guidelines recommend starting dietary therapy with a step-one diet, in which the intake of total fat is less than 30 percent of calories, saturated fat is less than 10 percent of calories, and cholesterol is less than 300 mg/day. If after 3 months on this diet cholesterol lowering is insufficient, the person should progress to a step-two diet, in which saturated fat is further reduced to less than 7 percent of total calories and cholesterol intake is further reduced to less than 200 mg/day.

Although in epidemiologic studies light to moderate alcohol consumption is associated with reduced heart disease risk, a cause-and-effect relationship has not been proved. Since heavy drinking has numerous adverse health consequences (see chapters on maternal and child nutrition and on alcohol), including several on the cardiovascular system, the use, even in moderate quantities, of alcohol for its possible beneficial effects on CHD is not recommended.

### **Nutrition Programs and Services**

#### **Food Labels**

Evidence related to the role of dietary factors in CHD supports the need for manufacturers to increase the number of food labels with their total fat, fatty acids, and cholesterol content.

#### **Food Services**

Evidence related to the role of dietary factors in CHD suggests that the public would benefit from increased availability of foods low in fat, saturated fat, and cholesterol in food service programs. The need is critical for the one in four persons with cholesterol levels that put them at appreciably high risk for CHD.

### **Food Products**

Evidence related to the role of dietary factors in CHD suggests that food manufacturers should increase availability of foods and food products that are low in fat, saturated fat, and cholesterol.

### **Special Populations**

Persons with high blood cholesterol and their food preparers should be given access to counseling by qualified health professionals and assistance in the development of diets low in fat, saturated fat, and cholesterol as well as in the appropriate balance of caloric intake and expenditure. Education and training opportunities for health professionals should be expanded to meet this need.

### **Research and Surveillance**

Research and surveillance issues of special priority related to the role of diet in CHD should include investigations into:

- The identification and management of individuals with high blood cholesterol in the general population.
- The most effective educational and dietary intervention strategies to reduce blood lipid levels and heart disease risk.
- Improved methods for assessing American dietary patterns in relation to CHD risk.
- Refinement of current dietary recommendations, including evaluation of other potentially efficacious dietary regimens, evaluation of dietary fiber, and optimal intakes of omega-3 and omega-6 fatty acids to prevent CHD.
- The mechanisms by which alterations in dietary fatty acids affect atherogenesis and the risk for CHD, including degree of saturation, chain length, and fatty acid series.
- Clarification of the role of dietary cholesterol in atherogenesis, including variability in response, effects on cholesterol metabolism in both fasting and postprandial states, and interactions of postprandial lipoproteins and lipoprotein remnants with cells of the arterial wall.

## High Blood Pressure

### Dietary Guidance

#### General Public

Dietary factors that clearly contribute to high blood pressure include obesity and excessive intake of sodium and alcohol. The average daily sodium consumption of 4 to 6 g by adult Americans is substantially above the National Research Council's recommended range of 1.1 to 3.3 g for safe and adequate intake and is 5 to 10 times higher than the amount required. Many individuals are able to maintain normal blood pressure levels over a large range of sodium intake; the lack of known harm from moderate sodium restriction, however, and the potential benefit to people whose blood pressures rise with increased sodium intake suggest that those who ingest excess sodium—most Americans—should consider reducing their dietary sodium intake.

The strong association between obesity and hypertension and the demonstrated reduction in blood pressure that occurs with weight loss suggest that maintenance of desirable body weight should be a goal for the population.

Similarly, there is a direct association between blood pressure and alcohol consumption beyond about two standard-sized drinks daily. (One standard-sized drink is defined as 12 oz of regular beer, 5 oz of wine, or 1½ oz of distilled spirits.)

Some evidence indicates that a reduction in blood pressure is associated with increased dietary intake of potassium, calcium, magnesium, and fiber. This evidence is, as yet, too preliminary to recommend increased intake of these factors for the general population for the purpose of hypertension control. Likewise, although increased intake of certain lipids (e.g., omega-6 or omega-3 polyunsaturated fatty acids) may decrease blood pressure, additional research is needed before any recommendations can be made.

#### Special Populations

Achieving and maintaining desirable body weight and moderating sodium and alcohol intake can lower blood pressure in patients with mild and moderate hypertension and reduce the need for antihypertensive medications. Such patients should be informed of the likely benefit of these dietary practices, along with the importance of adequate caloric expenditure

through exercise, and the moderation of fat intake, especially saturated fatty acids, to reduce high blood cholesterol levels and the risk for heart attack.

### **Nutrition Programs and Services**

#### **Food Labels**

Evidence related to the role of dietary factors in hypertension supports the need for nutrition labeling on a wide selection of foods so that the consumer has the option of choosing foods with known amounts of calories and sodium.

#### **Food Services**

Evidence related to the role of dietary factors in hypertension suggests that food service programs should provide adequate choices of foods that provide essential nutrients and energy to maintain desirable body weight and should include foods that are low in sodium.

#### **Food Products**

Evidence related to the role of dietary factors in hypertension suggests that food manufacturers should continue to reduce sodium in products and continue the research and development of products low in calories and sodium.

#### **Special Populations**

*Counseling and assistance in the selection and preparation of foods low in sodium and calories and assistance with the development of dietary patterns that control energy, sodium, and alcohol should be available to individuals whose blood pressure places them in the mild-to-moderate as well as high range of hypertension.*

### **Research and Surveillance**

Special priority is attached to the following research and surveillance tasks related to the role of diet in hypertension:

- Development of practical methods for the rapid and reliable identification of individuals at high risk for hypertension because they are salt sensitive.
- Investigation of the interactions of sodium with other nutrients—such as potassium, calcium, chloride, magnesium, fatty acids, and fiber—in influencing blood pressure.

- Investigation of the role of specific dietary factors, including potassium, calcium, fatty acids, fiber, amino acids, trace elements, and alcohol, in the cause and potential prevention of hypertension and the mechanisms for these effects.
- Investigation of the mechanism of obesity-associated hypertension and determination of the ratio of fat to lean body mass that might prevent development of hypertension.

## **Cancer**

### **Dietary Guidance**

#### **General Public**

The dietary factors evaluated for the possible relationship to cancer risk are fat, calories, fiber, foods high in vitamin A and carotenoids, and alcohol. Roles for vitamin C, vitamin E, selenium, protein, and salt-cured, salt-pickled, and smoked foods have been proposed.

Studies of carcinogen-induced tumorigenesis in experimental animals and international epidemiologic comparisons have provided substantial but not conclusive evidence that dietary fat increases the risk for cancers of the breast, colon, rectum, endometrium, and prostate. The results of epidemiologic investigations within more homogeneous population groups, however, are inconsistent. Because fat contains more than twice the calories per given quantity of protein or carbohydrate, high-fat diets are generally high in calories. Despite such complications, the animal and international epidemiologic data suggest that a decrease in fat consumption by the general public from the current 37 percent of total caloric intake might reduce the risk for certain cancers.

Results from animal and human studies of obesity and cancer are not wholly consistent, perhaps because of the difficulty of separating the effects of calories, fat, and body weight. Furthermore, the level of caloric restriction that seems effective in preventing cancer in most animal studies is at a food intake level not advisable for most humans. Consistent with other health recommendations, maintenance of desirable weight is recommended and may potentially decrease the risk of breast, colon, prostate, and endometrial cancers.

Correlational epidemiologic studies suggest an association between diets low in fiber and increased risk for colon cancer, while results from case-control studies are mixed. Studies in experimental animals indicate that

further research is needed on the effects of different types of fiber. While inconclusive, evidence suggests that an overall increase in intake of foods high in fiber might decrease the risk for colorectal cancer. Despite the need for additional evidence, this recommendation is consistent with guidance for reducing gastrointestinal disease.

Likewise, epidemiologic studies provide suggestive evidence that consumption of foods containing carotenoids, including the beta-carotene precursor of vitamin A, protects against development of epithelial cell cancers such as those of the oral cavity, bladder, or lung. These studies have generally shown lower rates of cancer among individuals consuming the highest overall levels of vitamin A, carotenoids, or fruits and vegetables. These studies have not distinguished the specific form of vitamin A associated with protection, nor have they ruled out the possibility of protection from as yet unidentified components of fruits and vegetables. Until the results of clinical trials examining these relationships become available, an increase in consumption of fruits and vegetables might benefit persons who now consume below-average amounts of these foods. There is no evidence that vitamin A in amounts greater than the RDA is beneficial.

Despite some difficulties in distinguishing the cancer-producing effects of excessive alcohol intake from those of cigarette smoking, evidence suggests that a reduction in alcohol intake among the portion of a population that drinks most heavily would help to reduce the prevalence of cancers of the mouth, esophagus, pharynx, and perhaps other sites.

Excessive selenium intake is toxic. This fact and limitations in information about selenium intake in the general population suggest that selenium intake should not be increased above levels now in the average diet.

Although some epidemiologic studies suggest an association between dietary protein and cancer incidence, these studies are limited and not consistently supported by animal evidence. Thus, the evidence does not justify a recommendation to the general public to decrease protein on the basis of its relationship to cancer.

There is some suggestive but not conclusive evidence that correlates consumption of salt-pickled, salt-cured, and smoked foods with stomach and esophageal cancers, indicating that the public should continue to limit its intake of these foods to the current low levels of consumption.

### Special Populations

Persons at high risk for diet-related cancers because of family history, obesity, or excessive alcohol intake should receive counseling from qualified health professionals to design approaches that could reduce their elevated risk for cancer.

Patients with cancer should receive appropriate nutritional support and dietary advice to maintain optimal nutritional status throughout medical, surgical, or radiological therapy. There is no credible evidence that nutritional changes specifically help in the cure of cancer patients.

Children and older persons are not currently targeted by the dietary guidelines relative to cancer risk due to limited data for these groups.

### Nutrition Programs and Services

#### Food Labels

Evidence related to the role of dietary factors in cancer suggests that food manufacturers should include on package labels information about nutritional content of the food, especially for fat and carbohydrate components (and including fiber components to the extent permitted by analytical methods).

#### Food Services

Evidence related to the possible role of dietary factors in cancer suggests that the public might benefit from increased availability of foods low in fat and high in fiber.

#### Food Products

Evidence related to the role of dietary factors in cancer suggests that foods low or reduced in calories and fat and high in fiber should be made increasingly available by food manufacturers.

### Special Populations

Persons with cancer should be provided with counseling and assistance in the development of diets appropriate to their condition.

## **Research and Surveillance**

Research and surveillance issues of special priority related to the role of diet in cancer should include investigations into:

- Molecular mechanisms of carcinogenesis and the ways in which initiating or promoting events may be affected by specific components of dietary fat, fiber, protein, alcohol, vitamin A, carotenoids, and other vitamins or minerals.
- Quantitative relationships between food and nutrient intake and cancer incidence through chemoprevention and dietary clinical trials.
- The effect of specific components of dietary fat, fiber, vitamin A, and carotenoids on cancer etiology.
- Interactions between dietary factors such as fat, fiber, calories, protein, and specific vitamins and minerals in cancer prevention and causation.
- Development of biochemical markers of dietary intake to better monitor effects of dietary intervention on cancer risk.
- Patterns of food intake best associated with cancer prevention.
- Development of national population data on food and nutrient consumption patterns and specific cancer rates, including more accurate assessment of intake of specific dietary factors within relatively homogeneous population groups.
- Levels of carcinogenic and mutagenic substances in the food supply.
- Dietary guidance methods that are most effective in helping people improve patterns of food intake.
- The causes of wasting and malnutrition in cancer patients and the effects of nutritional support on response to therapy and survival in these patients.

## **Diabetes**

### **Dietary Guidance**

#### **General Public**

Obesity greatly increases the risk for developing Type II diabetes, and obesity is in turn related to caloric imbalance: excessive intake of energy and/or insufficient energy expenditure. Because dietary fat contains more than twice the calories of either protein or carbohydrate, a reduction in fat



intake should lead to a more favorable caloric balance, especially when this dietary change is accompanied by appropriate levels of physical activity. Controlling obesity by reducing dietary fat intake should help reduce the prevalence of Type II diabetes and is also consistent with dietary recommendations for the prevention of coronary heart disease, hypertension, and some types of cancer.

#### Special Populations

Overweight persons with Type II diabetes benefit substantially from weight loss and may accrue benefits when fat, salt, alcohol, and simple sugars are reduced in combination with an appropriate increase in foods containing complex carbohydrates and soluble fiber. Even moderate weight loss, accomplished by reducing caloric intake and increasing energy expenditure, reduces blood glucose and insulin toward normal levels.

Current research suggests that diets relatively low in fat and cholesterol, salt, and protein can reduce the risk of the long-term cardiovascular, hypertensive, and renal complications of diabetes, respectively. Persons with diabetes and concurrent insulin-induced hypoglycemia, neuropathy, or poor metabolic control should avoid alcohol. Although research has not unequivocally established that complex carbohydrates and fiber improve blood glucose and insulin levels in individuals with diabetes, diets higher in these substances are generally lower in fat, cholesterol, and calories, and they are associated with lower blood lipid levels and, therefore, lower risk for coronary heart disease. Such diets can help reduce high blood cholesterol levels and the risk for coronary heart disease. Until similar uncertainties about the metabolic effects of sugar in persons with diabetes are resolved, prudence dictates caution in the amount of its use. Research on dietary management of Type I diabetes emphasizes the importance of weight maintenance, avoidance of hypoglycemia, and metabolic control by coordinating caloric intake and expenditure with the schedule of insulin administration. Information, counseling, and followup on the appropriate application of these dietary principles and guidance for dietary management should be provided to persons with diabetes by qualified health professionals.

#### Nutrition Programs and Services

##### Food Labels

The food industry should be encouraged to provide nutrition information on the labels of most food products. The information on calories, fat (especially saturated fat), and other nutrient content will help the public to

control caloric intake and will help persons with diabetes to make the necessary dietary modifications their physicians recommend.

#### Food Services

Evidence related to the role of dietary factors in diabetes currently holds no special implications for policy changes in food service programs.

#### Special Populations

Persons with diabetes of either type should be provided with counseling and assistance with dietary changes to control their disease. This should be coordinated with other aspects of their health care needs, such as insulin administration and levels of physical activity.

#### Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in diabetes should include investigations into:

- The role of calorie intake and physical activity, and subsequent weight control, in the prevention of Type II diabetes.
- The metabolic consequences of obesity.
- The metabolic mechanisms of intestinal and hepatic processing of dietary carbohydrate, and the effects of other nutrients and of fiber on carbohydrate metabolism.
- The influence of dietary carbohydrates on glycemic responses in persons with diabetes, and the effects of such responses on development of the cardiovascular, renal, retinal, and neurologic complications of this condition.
- The influence of specific dietary factors—fat, cholesterol, sugar, protein, fiber—on development of the cardiovascular, renal, retinal, and neurologic complications of diabetes.
- The long-term risks and benefits of non-nutritive sweeteners as aids to adherence to dietary regimens.
- The behavioral and environmental factors that influence adherence to weight loss and dietary regimens in persons with diabetes.
- The specific educational techniques that will improve acceptance of and adherence to therapeutic regimens.

## **Obesity**

### **Dietary Guidance**

#### **General Public**

Excess weight or overweight occurs when too few calories are expended and too many consumed for individual metabolic requirements. The extraordinarily high prevalence of obesity in the United States—one-fourth of American adults are overweight and nearly one-tenth are severely overweight—coupled with its role as a risk factor for diabetes, hypertension, coronary artery disease and stroke, gallbladder disease, and some types of cancer, suggests that a reduction in the average weight of the general population would improve the Nation's health. Americans, in general, would benefit from a lifestyle that includes more physical activity and a diet containing fewer calories.

Because fat contains more than twice the caloric value per gram of either protein or carbohydrate, the general public would benefit from reduced fat intake. In addition, it may be difficult to meet essential vitamin and mineral requirements on low-calorie diets. Because sugar and alcohol provide calories from carbohydrate but no other nutrients, individuals seeking to attain and maintain desirable body weight should use these substances sparingly.

Evidence indicates that exercise burns calories, increases the proportion of lean to fat body mass, and, therefore, raises the metabolic rate. Therefore, increased levels of physical activity are important for attaining desirable body weights among the general population.

#### **Special Populations**

Qualified health professionals should evaluate overweight persons for the presence of chronic disease risk factors—especially elevated blood cholesterol, blood glucose, or blood pressure. Such evaluation is important for individuals whose excess body fat is distributed mainly on the abdomen. This pattern is more typical for men than for women, and it increases risks for diabetes, high blood pressure, hyperlipidemia, and heart attacks.

Health professionals should work with obese persons to restrict caloric intake and to increase caloric expenditure. Such advice should also be provided to overweight persons, with or without other significant risk factors, to help reduce their risk for heart disease, stroke, some kinds of cancers, and many other diseases and to prevent or reduce psychosocial

complications of obesity. Professional guidance is recommended because many popular means to reduce weight may themselves pose risks to health and because unsupervised efforts to control obesity usually fail over the long term. Although excess body fat is difficult to lose, current research suggests that long-term individual or group programs that facilitate behavioral changes in diet and exercise are most likely to be effective. The intensity of these programs and the precise goal for weight loss should depend on the patient's degree and distribution of overweight, weight history, chronic disease risk factors, health status, and personal choices.

Current evidence is insufficient to recommend similar programs for overweight children. Obesity in infancy and childhood increases the risk for adult obesity, but most overweight children will not become obese. Because no method now exists to predict which children will develop obesity as adults, because research has not yet identified effective methods to prevent adult obesity, and because children require adequate energy and nutrients to develop and grow normally, low-calorie diets should not be generally recommended for this group. Instead, they should be reserved for children with elevated risk factors for chronic disease. For most overweight children and their families, qualified health professionals should provide counseling and assistance in developing diets that contain adequate, but not excessive, calories and social and physical activities in which the child enjoys participating.

### **Nutrition Programs and Services**

#### **Food Labels**

Evidence related to the role of diet in obesity indicates that calorie information should be provided on most food product labels.

#### **Food Services**

Evidence related to the role of diet in obesity suggests that service programs should include a variety of foods low in calories in their menus.

#### **Food Products**

Evidence related to the role of diet in obesity suggests that the food industry should continue to develop food products low in calories and with adequate nutrient content.

#### **Special Populations**

Overweight patients should be provided with counseling and assistance in the development of diets low in calories and high in essential nutrients, as

well as lifestyle modifications that include high levels of physical activity to achieve appropriate weight goals.

### **Research and Surveillance**

Research and surveillance issues of special priority related to the role of nutrition and exercise in obesity and weight management should include investigations into:

- Determination of ideal or desirable body weights for individuals or for the population of various ages.
- Determination of the health risks associated with various degrees of overweight in children and adults.
- Identification of an effective means to measure total body fat and its regional distribution in individuals and in the population.
- Identification of the types of obesity most associated with increased chronic disease risk.
- The contribution of genetic and metabolic factors to obesity, including the molecular and genetic basis of energy metabolism and the nature of genetic aberrations in human obesity.
- The effects of diet, exercise, and weight loss on metabolism and thermogenesis.
- The effects of physical activity on maintenance of desirable body weight.
- The identification of dietary, behavioral, environmental, or genetic factors that predict development of obesity or the ability to lose weight successfully.
- Identification of the dietary, behavioral, environmental, social, or genetic factors that increase the risk of overweight in high-risk population groups.
- The health consequences of repeated cycles of weight gain and loss.
- The most effective individual, group, and community intervention strategies for weight management.
- The most effective intervention strategies for use with high-risk groups.
- The most effective means by which to educate individuals and the public about the factors predisposing to weight gain and loss.
- The most effective ways in which to promote increased physical activity in the population.
- The long-term effectiveness of existing weight control programs.

## **Skeletal Diseases**

### **Dietary Guidance**

#### **General Public**

The prevalence, health consequences, and expense of osteoporosis among Americans make it a compelling public health priority. Dietary factors of particular concern are calcium, phosphate, vitamin D (and its hormonally active form calcitriol), protein, sodium, calories, and alcohol. How these factors affect peak bone mass development is important and requires further investigation. Other lifestyle factors that may decrease the risk for osteoporosis include increased exercise and decreased cigarette smoking. In postmenopausal women, estrogen-replacement therapy has been the best documented method of preventing osteoporosis.

The dietary factors associated with bone mass, the universality of bone loss with age, the interaction of diet and lifestyle with genetic factors, and the difficulties in measuring bone loss in populations make defining the relationship between diet and osteoporosis difficult. However, evidence suggests that, particularly during the first three to four decades of life, ingesting adequate calcium, maintaining appropriate body weight, exercising, restricting alcohol, and avoiding cigarette smoking are appropriate public health strategies for prevention of osteoporosis.

Most interest in the dietary control of osteoporosis focuses on calcium. Although current epidemiologic and clinical evidence is uncertain, chronic low calcium intake may decrease peak bone mass, especially during adolescence. Surveys indicate that dietary calcium intake of adolescent girls is one-third or more below the 1,200 mg/day recommended for this population and that adult women of reproductive ages also consume less than the recommended 800 mg/day. Although the ideal level of calcium intake for development of peak bone mass is unknown, and although it has not yet been established whether increased calcium intake will prevent osteoporosis, females, particularly adolescents and young adults, in the United States should increase food sources of calcium. The public should also be educated about the calcium content of various foods, particularly low-fat dairy products, and should maintain adequate calcium intake at all ages.

Additional study of the epidemiologic association between diets high in protein and increased prevalence of osteoporosis is required to make further conclusions.

### Special Populations

Children, pregnant and lactating women, and older people have special needs for calcium based on, respectively, the extra skeletal demands of growth, milk production, or the age-related decrease in absorption of calcium. Older Americans consume amounts of calcium that average as much as 40 percent below current recommendations of 800 mg/day. Postmenopausal women should receive counseling on supplemental use of estrogen, and all groups should receive information about calcium-rich foods. People who take calcium supplements also need education on appropriate use, side effects, the forms in which they are best absorbed, and interactions with other medications.

### Nutrition Programs and Services

#### Food Labels

Present evidence on the role of dietary factors in skeletal disease has no special implications for change in policy related to food labeling. However, nutrition labeling, which lists calcium and other nutrient content, should be encouraged on most food products.

#### Food Services

Aside from the special populations noted below, evidence related to the role of dietary factors in skeletal diseases currently holds no special implications for change in policy related to food service programs.

#### Food Products

Foods abundant in calcium are widely available in the United States. However, the diversity of U.S. dietary patterns suggests the possibility of calcium fortification of a limited number of foods. These additions should be carefully selected to avoid excessive calcium in the food supply. Fortification should be chosen based on the frequency of consumption of a food by the targeted populations, and the calcium should be in a physiologically available form. It is important to continue fortification of suitable foods with vitamin D because this has been instrumental in reducing the prevalence of rickets and osteomalacia in the United States.

### Special Populations

Food services offered to children, adolescents, and young adults should provide diets with sufficient calcium to enhance achievement of peak bone

mass. Persons who are unable to convert vitamin D to its active form may require supplementation with calcitriol. Those with chronic malabsorption syndromes may require supplementation with calcium or calcitriol.

Whether calcium, vitamin D, or calcitriol should be provided to older women to prevent or delay postmenopausal bone loss is as yet uncertain. Although evidence for the precise role of physical activity in prevention of osteoporosis is still emerging, it seems reasonable to include exercise as a component of any program to enhance the skeletal integrity of older Americans. Older persons should be encouraged to maintain regular activities such as walking and other weight-bearing exercise.

### **Research and Surveillance**

Research and surveillance issues of special priority related to the role of diet in skeletal diseases should include investigations into:

- Changes in calcium and phosphate requirements throughout life.
- The effects of altering proportions of phosphate and protein on calcium requirements and bone mineralization.
- The effects of increased calcium intake on peak bone mass and on prevention of postmenopausal bone loss.
- Potential toxicities of high-dose supplements of calcium.
- The development of calcium sources with improved bioavailability.
- Safe and adequate levels of vitamin D added to the food supply.
- The relationship of vitamin D and its metabolites to calcium in the development of peak bone mass and prevention of bone loss.
- The levels of vitamin D and its metabolites, fluoride, and calcium that are safe and adequate for the treatment of osteoporosis.
- The effects of moderate and excessive alcohol intake on bone mineral metabolism.
- The effects of various levels of physical activity on loss of bone mass.
- The relationship of other vitamins and minerals to peak bone mass and to prevention of bone loss.