

Diet and Diabetes

Fact Sheet No. 9.334

Food and Nutrition Series | Health

by J. Anderson, P. Kendall, S. Perryman and S. Prior*

Diabetes is the fifth-deadliest disease in the U.S. and has no cure. Based on research of the last decade the American Diabetes Association published an updated position statement in 2002 to replace recommendations from 1994.

Diabetes encompasses a variety of metabolic abnormalities. The belief that a single diabetic or ADA diet exists for people with diabetes is no longer valid. Rather, it is recommended that people with diabetes work with their diabetes management team (registered dietitian, nurse, physician and other health care professionals, as needed) to develop a nutrition care plan that fits their own metabolism, nutrition and lifestyle requirements.

Goals of Diabetes Management

The three cornerstones of diabetes management are diet, physical activity and medication if needed (i.e., insulin or oral glucose-lowering agents). Food raises blood glucose and blood fat levels. Activity and medications lower blood glucose and blood fat levels.

Type 1 Diabetes

Diabetes is categorized as type 1 or type 2, based on the underlying physiological problem. Type 1 diabetes, formerly known as insulin-dependent diabetes mellitus (IDDM), is characterized by the destruction of the pancreatic beta cells that produce insulin. The end result is absolute insulin deficiency. Insulin must be taken regularly. Type 1 diabetes occurs most often in children and young adults, but it can occur at any age.

*J. Anderson, Colorado State University Extension foods and nutrition specialist and professor, food science and human nutrition; P. Kendall, Extension foods and nutrition specialist and professor; S. Perryman, Extension foods and nutrition specialist; and S. Prior, former graduate intern, food science and human nutrition. 5/2007

Previously, people who took insulin had to follow a rigid pattern of eating. This sometimes created conflicts that resulted in varying degrees of noncompliance. The current recommendations are more flexible; they recommend integrating insulin therapy into the individual's usual eating and exercise patterns. They also allow a person to adjust the timing and quantity of insulin injected in accordance with monitored blood glucose levels.

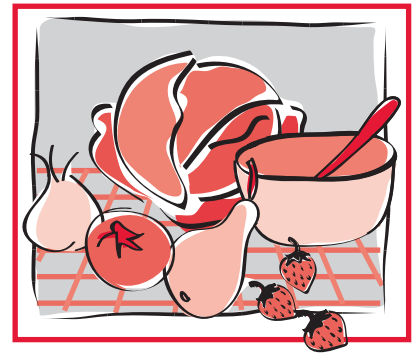
A primary treatment goal in type 1 diabetes should be tight blood glucose control. Frequent blood glucose monitoring is recommended. Blood glucose monitoring can show which foods, physical activities and/or times of the day elevate an individual's blood glucose level. By adjusting insulin dose to meet needs, a person may have more near-normal blood glucose levels and help reduce the risk for short- and long-term complications.

It is still highly recommended that people using insulin therapy eat at consistent times and consume consistent amounts of carbohydrates to synchronize with the time-action of the insulin preparation they are using. However, by using multiple daily injections and frequent monitoring of blood glucose levels, people with diabetes can quickly adjust to account for changes from their usual eating and exercise habits.

Type 2 Diabetes

Type 2 diabetes, formerly known as non-insulin dependent diabetes mellitus (NIDDM), is by far the most common form of the condition. More than 90 percent of all people with diabetes have this type.

Type 2 diabetes develops because of insulin resistance, in which the body is unable to use insulin properly, combined with a relative (not absolute) insulin deficiency. The risk of developing type 2 diabetes increases with age, obesity and lack of physical activity. Typically, adults with type 2 diabetes are



Quick Facts

- Diabetes management should consider nutrition, physical activity and pharmacologic therapies.
- The overall goals of nutrition therapy include achievement and/or maintenance of near-normal blood glucose and blood pressure levels, optimal serum lipid levels and reasonable weight, the prevention of acute and long-term complications, optimal nutrition and physical activity, and consideration of personal and cultural preferences and lifestyle.
- Saccharin, aspartame, acesulfame K and sucralose are safe to consume by people with diabetes, within a balanced diet.

© Colorado State University Extension. 8/03. Revised 5/07.

www.ext.colostate.edu



over 45, overweight and sedentary, with a family history of diabetes, and have high blood pressure and high cholesterol. There's a greater possibility that women in this group had diabetes during pregnancy and delivered a baby that weighed more than 9 pounds. Recently, however, we have seen an alarming trend in the United States of type 2 diabetes developing in adolescence. These youth tend to be older than 10 years of age, experiencing puberty, and have a strong family history of type 2 diabetes. Diabetes is also more common in African Americans, Latinos, Native Americans, Asian-Americans and Pacific Islanders.

Total calories consumed should be sufficient to maintain a desirable weight and prevent weight gain. Achieving and maintaining weight loss has long been a primary dietary focus for people with type 2 diabetes. Physical activity on a regular basis is recommended. Aiming for blood glucose control, along with normal blood lipid levels and normal blood pressure are also important goals. These factors, if controlled, help reduce the risk of long-term complications of diabetes.

An initial strategy for type 2 diabetes is to improve food choices to better meet the recommendations of the *Dietary Guidelines for Americans* and the Food Guide Pyramid. Reducing fat, especially saturated fat, is highly recommended. Plan to eat meals throughout the day to spread nutrient intake. Even mild to moderate weight loss (10 to 20 pounds) has been shown to improve diabetes control. Lifestyle changes that moderately decrease calorie intake (250 to 500 kcal/day) and increase energy expenditure are strongly encouraged.

Major Nutrient Recommendations

Protein. Protein intake accounts for 15 to 20 percent of total daily calories consumed among the general population as well as those with diabetes. There is no evidence to indicate the usual protein intake should be modified if renal function is normal. A protein intake above 20 percent may have a detrimental effect on development of nephropathy (renal disease).

Fat and Carbohydrate. The most life-threatening consequences of diabetes are cardiovascular disease (CVD) and stroke, which strikes people with diabetes more than twice as often as others. Diabetes itself is a strong independent risk factor for

CVD. Thus, steps that help reduce this risk are important.

In persons with diabetes there are two primary goals for fat consumption: limit saturated fat and dietary cholesterol. Saturated fat is linked to low density lipoprotein (LDL) cholesterol levels. It is recommended that less than 10 percent of calories should come from saturated fat. Individuals with LDL cholesterol greater than or equal to 100 mg/dl may benefit from lowering their intake of saturated fat intake to less than 7 percent of calories consumed. To lower LDL cholesterol, calories from saturated fat can be reduced for weight loss or replaced by carbohydrate or protein if no weight loss is desired.

Total fat should be 30 to 35 percent or total calories. Polyunsaturated fat is limited to 10 percent and monounsaturated fat to 20 percent of total calories.

Dietary cholesterol should be less than 300 mg/day. Those individuals with LDL cholesterol greater than or equal to 100 mg/dl may benefit from lowering dietary cholesterol to less than 200 mg/day. Elevated levels of triglycerides (greater than 150 mg/dl) are also a risk factor for CVD. The addition of exercise may result in greater decreases in total and LDL cholesterol and triglycerides, and prevent a decrease in high density lipoprotein (HDL) cholesterol. Plant stanols or plant sterols, such as those found in cholesterol-lowering margarines, should be in the amount of approximately 2 g/day.

Intake of trans fatty acids should be limited. The effect of trans fatty acids is similar to saturated fat in raising LDL cholesterol. In addition, trans fatty acids lower HDL cholesterol which is not desirable.

Current fat replacers, approved by the FDA, may help reduce dietary fat intake, including saturated fat and cholesterol, but they may not reduce calories or result in weight loss. Reduced-fat diets can contribute to weight loss and improvement of abnormal blood lipids over the long term.

Guidelines for cholesterol management, recommended in May 2001, replaced the National Cholesterol Education Program's (NCEP's) Step II diet. These new guidelines, issued in the Adult Treatment Panel III (ATP III), recommend Therapeutic Lifestyle Changes (TLC), a lifestyle approach to reduce CVD. For people with diabetes whose LDL cholesterol is above the goal level for their category of risk for heart disease, TLC is recommended.

The TLC approach includes a cholesterol-lowering diet, physical activity and weight management.

Sugar. It was previously believed that simple sugars are more rapidly digested and absorbed than starches, and therefore are more likely to cause high blood sugar levels. This premise has not been supported by scientific evidence. The 2002 guidelines allow the use of sugar and sugar-containing foods in **modest** amounts as part of a balanced diet. It should be remembered, however, that sugar-containing foods must be substituted for other carbohydrate foods and not simply added on top of what is eaten. The first consideration should be the total amount of carbohydrate eaten. This does not mean that sweets should be eaten with every meal or even every day. Sweets also can be high in calories. As stated in fact sheet 9.353, *Dietary Guidelines for Americans*, moderation is the key.

Non-nutritive Sweeteners. Saccharin, aspartame, acesulfame potassium (K) and sucralose have been approved by the Food and Drug Administration (FDA) and can be used by people with diabetes, including pregnant women, within a balanced diet. Because saccharin can cross the placenta, other sweeteners are better choices during pregnancy. (See fact sheet 9.301, *Sugar and Sweeteners*.)

Fiber. Fiber recommendations for people with diabetes are the same as for the general population, 20 to 35 grams from a wide variety of sources daily. Of the recommended total fiber intake, 10 to 25 g/day should come from soluble fiber. Because of the potential beneficial effect of soluble fibers on serum lipids and glucose metabolism, people with diabetes are advised to get adequate amounts of fiber from the carbohydrates they eat. Good sources of soluble fiber include oat products, many fruits and vegetables, cooked beans, rice bran and psyllium seeds. (See fact sheet 9.333, *Dietary Fiber*.)

Methods for Planning Diets

Dietary management of diabetes should be designed to meet total nutrient and health needs, not just blood glucose needs. Begin with an assessment of the individual's usual eating habits, including food likes and dislikes, eating and work schedules, as well as treatment goals identified by the health care team. The better dietary management fits into one's usual routine, the more likely it is to be successful. The following

diet planning systems can be helpful when planning meals and snacks for people with diabetes.

Plate Method. The Plate Method is a simple method for teaching meal planning. A 9-inch dinner plate serves as a pie chart to show proportions of the plate that should be covered by various food groups. This meal planning approach is simple and versatile. Vegetables should cover 50 percent of the plate for lunch and dinner. The remainder of the plate should be divided between starchy foods, such as bread, grains, or potatoes, and a choice from the meat group. A serving of fruit and milk are represented outside the plate.

Diabetic Exchange Diets. In this system, food is separated into six categories based on macro nutrient content (i.e., starch [cereals, grains, pasta, bread, beans, and starchy vegetables], meat and meat-substitutes, non-starchy vegetables, fruits, milk and fats). Individuals, with the help of a physician or dietitian, design a daily meal plan based on a set amount of servings from each category. The Food Exchange method allows a person to measure rather than weigh food. This saves time and encourages compliance. Any food may be substituted for another within the same food exchange list. As with other methods, all meals and snacks should be eaten at about the same time each day and be consistent in the amount of food consumed.

Carbohydrate Counting. Some people choose to count the grams of carbohydrate in various foods, and adjust the amount of carbohydrate consumed during the day as a reflection of blood glucose levels. One choice from the starch, fruits, milk, or sweets and dessert list supplies about 15 grams of carbohydrate. Each selection is considered one carbohydrate choice. A meal plan outlines the number of carbohydrate choices a person may select for meals and snacks. This method requires great diligence with diet and blood glucose monitoring.

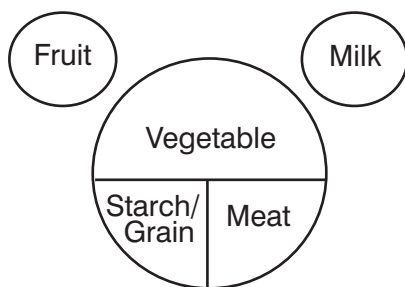


Figure 1: The plate method.

Dietary Guidelines/MyPyramid.

MyPyramid strives to put the *Dietary Guidelines for Americans* into action. It provides a conceptual framework for selecting the kinds and amounts of various foods, which together provide a nutritious diet. MyPyramid focuses on variety and on reducing the amount of added fat and sugar in the diet. The bread/cereal, vegetable and fruit groups make up the base of the diet. For more details, see fact sheet 9.306, *A Guide to Daily Food Choices*.

Using Nutritional Labeling

With any of the diet planning methods mentioned above, the nutrition facts label found on most foods can provide much useful information. If you are counting carbohydrates, total grams of carbohydrates per serving are listed on the label, along with grams of sugars and dietary fiber. For more information on food labeling, request 9.365, *Understanding the Food Label*.

If you are using the exchange lists method of diet planning, exchanges can be developed for new foods based on the grams of protein, carbohydrate and fat provided per serving. Be aware that the serving sizes given on labels may not be the same as those used in the *Exchange Lists for Meal Planning*. For example, the label serving size for orange juice is 8 fluid ounces. In the Exchange Lists, the serving size is 4 ounces (1/2 cup). Thus, a person who drinks 1 cup of orange juice has consumed two fruit exchanges.

If you are using MyPyramid in menu planning, pay close attention to the percent daily value column of the nutrition facts label. Look for foods that have low percent daily values for fat, saturated fat and cholesterol, and high percent daily values for fiber. Also note the calories per serving, calories from fat, and the trans fat content. (All food labels now list trans fat content.)

For More Information

American Diabetes Association:

www.diabetes.org or 1-800-342-2383

American Dietetic Association:

www.eatright.com/catalog or 1-800-877-1600 ext. 5000

National Diabetes Education Program:

<http://ndep.nih.gov> or 1-800-438-5383

References

- Diabetes Threat on the Rise Among U.S. Children, Specialists Say. *Chronic disease notes and reports*. National Center for Chronic Disease Prevention and Health Promotion. Vol. 12 No. 2, Spring/Summer 1999.
- Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA*. 2001, 285(19):2486-2497.
- Franz, M.J., Bantle, J.P., Beebe, C.A., Brunzell, J.D., Chiasson, J.L., Garg, A., Holzmeister, L.A., Hoogwerf, B., Mayer-Davis, E., Mooradian, A.D., Purnell, J.Q. and Wheeler, M. Evidence-Based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications. *Diabetes Care*. 2002; 25(1):148-198.
- Funnell, M.M., Hunt, C., Kulkarni, K., Rubin, R.R., and Yarborough, P.C.. *A Core Curriculum for Diabetes Education*. 3rd ed. American Association of Diabetes Educators, Chicago, Ill. 1998.
- Kurtzweil, P. *The New Food Label: Coping with Diabetes*. *FDA Consumer* 1994; November:20-25.
- Position Statement of the American Diabetes Association. Evidence-Based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications. *Diabetes Care*. 2003; Volume 26, Supplement 1.
- Position Statement of the American Diabetes Association. Evidence-Based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications. *Diabetes Care*. 2003; Volume 26, Supplement 1.

Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating. CSU Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.