Evidence-based “Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications” outline the goals of medical nutrition therapy for type 1 and type 2 diabetes mellitus. Those goals are (1) to attain and maintain optimal metabolic outcomes, (2) to prevent and treat the chronic complications of diabetes, (3) to improve health through healthy food choices and through physical activity, and (4) to address individual patient nutritional needs. Discussion focuses on moderate caloric restriction and an increase in physical activity. Carbohydrate counting is offered as an option for all patients with diabetes. Working with other health care professionals can be a benefit to both the primary health care provider and the patient.

The recently published “Evidence-based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications” provides a solid foundation for the advice physicians give their patients. Over the years, the American Diabetes Association (ADA) nutrition recommendations were based on scientific knowledge, clinical experience, and expert consensus. Currently, these recommendations are graded according to the quality of the evidence that supports them. Historically, health care personnel have recommended strict guidelines for what, when, and how much to eat.

The 1500- or 1800-calorie ADA diet was freely distributed to most people who had diabetes (pharmaceutical companies supplied tear-off sheets). For years, individuals with diabetes were told not to eat sugar because intuitively clinicians knew that was correct. Today, the evidence demonstrates that advice is wrong. Unfortunately, in some circumstances, this incorrect advice is still being given. Today, recommendations are based on evidence, and with the advent of the varieties of medications and carbohydrate counting available today, people with diabetes can eat anything they wish and adjust their insulin to maintain glucose control. However, they do need to make nutritional choices that will help them attain and maintain good health.

The other important change in the current recommendations is that for the first time, they address both the treatment and prevention of diabetes and related complications. The recently published results of the Diabetes Prevention Program (DPP) provide clear evidence that diabetes can be prevented and that lifestyle change is an effective intervention.

Goals of Medical Nutrition Therapy for Diabetes

The goals of medical nutrition therapy for diabetes (Figure 1) are practical and attainable.

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First and foremost is to attain and maintain optimal metabolic outcomes. It is important to keep the plasma glucose level as near normal as practical to prevent the complications of diabetes. Blood pressure also needs to be as near normal as possible. Maintaining a lipid profile that will reduce the risk for macrovascular disease is essential. In the past, emphasis has been on eating foods with a specific nutrient profile or maintaining strict caloric control. Currently, the goal is to attain a desirable outcome, with the focus on the endpoint rather than on the process.

The second goal is to prevent and treat the chronic complications of diabetes. The health care team might need to help patients modify what they eat to help them lose weight if they are overweight or obese, to treat them for hyperlipidemia, cardiovascular disease, hypertension, or nephropathy. Many different ways exist to help individuals lose weight. The bottom line for many people is a combination of decreased caloric intake and increased caloric output. Some patients may need to lower saturated fat, sodium, or protein intake. In some cases, individuals may need to modify their intake of all these nutrients. It is crucial to provide the education that patients with diabetes need to help them make appropriate choices.

The third goal is to improve health through healthy food choices and through physical activity. One cannot talk about medical nutrition therapy for diabetes without addressing physical activity. Physical activity can be incorporated into daily activities. If patients choose activities they enjoy, they will participate in them more frequently. Recreational activities, such as dancing or gardening, may prove much more palatable and just as beneficial as jogging or walking on a treadmill.

Healthful food choices in conjunction with physical activity are the key to self-management.

The fourth goal is to address individual nutritional needs concomitantly with the cultural preferences of patients and their wishes and willingness to change. People like certain foods because that is what they are used to eating, and those foods are what their ethnic groups eat. It is unrealistic to suggest that patients give up foods they have eaten all their lives. It is appropriate for the health care team to help them determine how they can continue to eat food they enjoy while managing to keep their diabetes in good control. This may mean adjusting portion size, or it may mean changes in preparation to reduce calories and fat. It is the job of the health care professional to determine what changes patients are willing to make and to help them successfully make these changes.

**Lifestyle Balance**

Lifestyle is important (Figure 2). If a patient never wants to eat in the mornings, medications can be adjusted so that they do not have to eat before noon. Individualizing is very important. There is no one official ADA diet, and when we talk about how people eat, “one size” certainly does not fit all. Every patient needs an individual meal plan. The ADA recommends that patients see a registered dietitian (RD) for medical nutrition therapy to develop an individualized meal plan to meet each patient’s unique needs. If clinicians do not have access to an RD, the American Dietetic Association Web site (Figure 3) is a helpful resource for such information. The RD with expertise in diabetes can make the physician’s job and life a lot easier.

Moderate caloric restriction can make a big difference. The DPP proved that if people lost between 5% and 10% of their body weight, it made a significant difference in their health. How does that translate? If patients who weigh 300 pounds lose as little as 15 to 30 pounds, they can improve their health. What is really important to remember is that if someone weighs 300 pounds and goes to a physician who says, “You need to lose 100 pounds,” that person typically will turn the physician off and leave the doctor’s office. Whereas, on the contrary, if the health care provider says to that patient, “You know, it would be really good if you could lose some weight. Why don’t you aim for 5 pounds?” the patient most probably will be in a state of shock, but chances are the next time that patient comes back, he or she will have lost that 5 pounds. Why? Because 5 pounds is an attainable goal. Helping patients set realistic goals is a crucial part of helping them succeed. The techniques used in the DPP are transferable to helping people with diabetes meet self-management goals.

The ADA nutrition recommendations specifically address saturated fat. The basis for the recommended saturated fat intake is that patients with diabetes have an increased risk for coronary heart disease. Consequently, the saturated fat goals for people with diabetes are the same as those recommended by the American Heart Association. Saturated fat intake should not be more than 10% of total calories and, if people have hyperlipidemia, the amount should be reduced to 7%. However, because the DPP inter-

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**Checklist**

- Attain and maintain optimal metabolic outcomes:
  - Blood glucose level
  - Blood pressure
  - Lipid levels
- Prevent and treat chronic complications of diabetes.
- Improve health through healthy food choices and physical activity.
- Address individual nutritional needs, cultural preferences, and lifestyle.
American Association of Diabetes Educators
www.aadnet.org
Find a diabetes educator in your area.

American Diabetes Association
www.diabetes.org
Access the 2002 Clinical Practice Guidelines for health care professionals as well as find links to research journals and resources.

American Dietetic Association
www.eatright.com
Find a diettian with expertise in diabetes in your area.

Centers for Disease Control and Prevention: Division of Diabetes Translation (DDT)
www.cdc.gov/diabetesindex.htm
The DDT translates scientific research into standards for daily practice and consumer information. Site provides a schedule of conferences for professionals, publications, and a downloadable version of the 1999 Diabetes Surveillance Report.

Centers for Disease Control and Prevention: Diabetes Project Children and Diabetes
www.cdc.gov/diabetesprojectsdiab_child.htm
Available reports on the diagnosis, epidemiology, and prevalence of type 2 diabetes in children.

National Diabetes Education Program (NDEP)
http://ndep.nih.gov/
Check out the new “Be Smart about Your Heart: Control the ABCs of Diabetes” brochure. Consumer information is also provided in Spanish and Asian languages. The NDEP has partnered with public and private organizations for improving prevention and treatment of diabetes based on current scientific information.

National Institute of Diabetes and Digestive and Kidney Diseases—Nutrition
www.niddk.nih.gov/healthnutrition.htm
Find consumer handbooks and information sheets for diabetes, renal, and weight loss nutrition.

Figure 3. Diabetes resources available on the World Wide Web.

Carbohydrate Counting
Carbohydrate is the macronutrient with the greatest impact on postprandial blood glucose levels (Figure 4). Starches and sugars are carbohydrates. They are found in green vegetables such as asparagus and spinach, in fruit and fruit juice, in candy and soft drinks, as well as in starchy such as pasta and bread. The body is unable to distinguish the source of carbohydrate.

According to the ADA, carbohydrate and monounsaturated fat combined should provide 60% to 70% of energy. Information on carbohydrates can be found on the “Nutrition Facts” panel on food labels. This panel lists both total carbohydrates and sugars as a part of total carbohydrates. Additionally, many books are available listing the carbohydrate content in both individual foods and fast food meals. Patients can use these lists to figure out how much carbohydrate is in the food they are eating.

Carbohydrate counting is an option for everyone who has diabetes. If individuals have type 1 or type 2 diabetes and inject insulin to control their blood glucose level, they can match the insulin they inject with the carbohydrate they eat. Patients who have type 2 diabetes and do not require exogenous insulin can still use carbohydrate counting to eat a consistent amount of carbohydrate from day to day and have the freedom to select their carbohydrate from a wide variety of foods. For example, a turkey sandwich (two slices of bread, 30 g of carbohydrate) one day will have the same effect on the blood glucose level as 1 cup of tomato soup and six saltines (30 g of carbohydrate) on another day.

How does it work? Each individual who injects insulin must develop an insulin-carbohydrate ratio. They do this by working with an RD who has expertise in diabetes, preferably a certified diabetes educator (CDE), to determine how much insulin is needed for a set amount of carbohydrate, usually 15 g. Assume the car-
Carbohydrate-insulin ratio is 15 g of carbohydrate to 1 U of insulin. If the preprandial blood glucose level is in the target range, the insulin needed for the 90-g carbohydrate meal would be 6 U of regular insulin lispro or insulin aspart. If the carbohydrate intake is increased to 105 g, then the insulin need would be 7 U if the preprandial blood glucose level is in a target range. If the carbohydrate-insulin ratio is 10:1, 9 U of insulin would be needed for that 90-g carbohydrate meal. Although physicians may not need to know this process for determining insulin requirements in relation to the number of grams of carbohydrate consumed, patients do need to know it. The insulin-carbohydrate ratio varies from individual to individual. Some have different ratios for breakfast than for lunch or dinner; some have a different ratio on work days and days off.

Comment
Small changes can help patients with diabetes control their disease and prevent complications. Little things like a 5- to 10-pound weight loss or small increases in physical activity can make a big difference. Physicians should seek help from other health care team members or professionals of other disciplines. I would recommend that if physicians do not already work with an RD or CDE, they should find one and establish a relationship. These professionals can help patients develop a carbohydrate-insulin ratio and save physicians from having to solve a lot of those problems.

Figure 3 provides a list of Web sites of diabetes-related resources. “Recognized Diabetes Education Programs” appears on the ADA Web site. The American Association of Diabetes Educators and the American Dietetic Association will put physicians in touch with a CDE or an RD in their practice area. Many of the listed Web sites have free things you can download. The National Diabetes Education Program Web site has a plethora of patient and professional education materials that are free and available for downloading.

References