Patient information: Type 1 diabetes mellitus and diet (Beyond the Basics)

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TYPE 1 DIABETES OVERVIEW

Diet and physical activity are critically important in the management of the ABCs (**A**1C, **B**lood pressure and **C**holesterol) of type 1 diabetes. To effectively manage A1C (hemoglobin A1C) and achieve stable blood sugar control, it is important to understand how to balance food intake, physical activity, and insulin.

Making healthy food choices every day has both immediate and long-term effects. With education, practice, and assistance from a dietitian and/or a diabetes educator, it is possible to eat well and control diabetes.

This topic discusses how to manage diet in people with type 1 diabetes. The role of diet and activity in managing blood pressure and cholesterol is reviewed separately. (See "Patient information: High blood pressure, diet, and weight (Beyond the Basics)" and "Patient information: High cholesterol and lipids (hyperlipidemia) (Beyond the Basics)".)

WHY IS DIET IMPORTANT?

Many factors affect how well diabetes is controlled. Many of these factors are controlled by the person with diabetes, including how much and what is eaten, how frequently the blood sugar is monitored, physical activity levels, and accuracy and consistency of medication dosing. Even small changes can affect blood sugar control.

Eating a consistent amount of food every day and taking medications as directed can greatly improve blood sugar control and decrease the risk of diabetes-related complications, such as coronary artery disease, kidney disease, and nerve damage. In addition, these measures impact weight control. A dietitian can help to create a food plan that is tailored to your medical needs, lifestyle, and personal preferences.

TYPE 1 DIABETES AND MEAL TIMING

Consistently eating at the same times every day is important for some people, especially those who take long-acting insulin (eg, NPH). If a meal is skipped or delayed, you are at risk for developing low blood glucose.

People who use intensive insulin therapy (those on an insulin pump or multiple daily insulin injections) have more flexibility around meal timing. With these regimens, skipping or delaying a meal does not usually increase the risk of low blood sugar.

High fat meals — Foods or meals that are high in fat (eg, pizza) may be eaten occasionally, although blood glucose levels should be monitored more closely. High-fat meals are broken down more slowly than low-fat meals. When using rapid acting insulin (eg, Humalog, Novolog) before a meal, the blood sugar level may become low shortly after eating a high fat meal and then rise hours later.

People who use an insulin pump can use an extended insulin delivery regimen to better manage blood sugar levels after eating a high-fat meal. People who give insulin injections do not generally adjust their treatment based upon the fat content of their meal.

TYPE 1 DIABETES AND CARBOHYDRATE CONSISTENCY

Carbohydrates are the main energy source in the diet, and include starches, vegetables, fruits, dairy products, and sugars. Most meats and fats do not contain any carbohydrates.

Carbohydrates have a direct impact on the blood sugar level whereas proteins and fat have little to no impact. Eating a consistent amount of carbohydrates at each meal can help to control blood sugar levels, especially if you take long-acting insulin (eg, NPH).

There are several ways to calculate carbohydrate content of a meal, including carbohydrate counting and exchange planning.

Carbohydrate counting — A dietitian usually helps to determine the number of carbohydrates needed at each meal and snack, based upon your usual eating habits, insulin regimen, body weight, nutritional goals, and activity level. In most people, between 45 and 65 percent of the day's total calories should come from carbohydrates.

The way carbohydrates are divided up for each meal or snack is based upon personal preferences, meal timing and spacing, and type of insulin regimen (table 1).

The number of carbohydrates in a food can be determined by reading the nutrition label, consulting a reference book or website, carrying a database on a personal digital assistant (PDA), or using the Exchange system. Restaurants usually have this information available upon request. (See 'Where to get more information' below.)

It is important to note the serving size and grams of fiber when calculating carbohydrates. Eating more than one serving will increase the number of calories and carbohydrates consumed and the dose of insulin needed to cover the meal. For example, some pre-packaged snacks contain two or more servings. To calculate the carbohydrate content of the entire package, multiply the number of servings by the number of carbohydrates.

When a serving of food has more than 5 grams of fiber, the grams of fiber should be subtracted from the grams of carbohydrates to calculate the insulin dose (figure 1) [1].

Exchange planning — With exchange planning, all foods are categorized as either a carbohydrate, meat or meat substitute, or fat. In this system, one serving of a carbohydrate (eg, one small apple) can be exchanged for any other carbohydrate (eg, 1/3 cup cooked pasta) because both servings contain about 15 grams of carbohydrate. You can also easily determine the carbohydrate content of your meals and snacks using the Exchange system (table 2).