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Understanding Advanced Carbohydrate Counting — A Useful Tool for Some Patients to Improve Blood Glucose Control

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Carbohydrate, whether from sugars or starches, has the greatest impact on postprandial blood sugar levels compared with protein and fat. For this reason, carbohydrate counting has become a mainstay in diabetes management and education. Patients with type 1 or 2 diabetes benefit from carbohydrate counting in terms of improvements in average glucose levels,[1,2] quality of life,[2,3] and treatment satisfaction.[3]

Basic carbohydrate counting is used to keep blood glucose levels consistent, while advanced carbohydrate counting helps with calculating insulin dose. Both basic and advanced carbohydrate counting give people with diabetes the freedom to choose the foods they enjoy while keeping their postprandial blood glucose under control.

This continuing education course introduces advanced carbohydrate counting as a tool for improving blood glucose management, evaluates basic and advanced carbohydrate counting, describes good candidates for advanced carbohydrate counting, and discusses strategies for counseling patients as well as precautions when using advanced carbohydrate counting.

Basic Carb Counting

Basic carbohydrate counting is a structured approach that emphasizes consistency in the timing and amount of carbohydrate consumed. Dietitians teach patients about the relationship among food, diabetes medications, physical activity, and blood glucose levels.[4]

Basic carbohydrate counting assigns a fixed amount of carbohydrate to be consumed at each meal and, if desired, snacks. Among the skills RDs teach patients are how to identify carbohydrate foods, recognize serving sizes, read food labels to determine the amount of carbohydrate an item contains, and weigh and measure foods.

Counting is based on the principle that 15 g of carbohydrate equal one carbohydrate serving (or one carb choice). While the amount of carbohydrate and the timing of intake should remain constant, the type and variety of foods consumed should not.

Indications for Basic Carb Counting

Basic carbohydrate counting is indicated for the following groups:

- **Patients who desire an approach to eating that will promote weight loss:** These patients follow a meal plan outlining how many grams or servings of carbohydrate they should consume per meal. By keeping the amount of carbohydrate consumed at each

meal regulated, they're more likely to eat a consistent number of calories as well. However, since it's possible to take in excessive calories from protein and fat while carbohydrate intake remains the same, dietitians also should address weight management with these patients.

- **Patients who control their diabetes with diet and exercise alone:** Practicing basic carbohydrate counting and regularly engaging in physical activity can help regulate blood glucose.

- **Patients using a split-mixed insulin regimen:** An example of a split-mixed insulin regimen is one that involves using Humalog 75/25 or Humulin 70/30 twice per day. This type of regimen is designed to work the hardest or peak (usually hours after injection) to counteract the rise in blood glucose from a meal. Therefore, those using split-mixed regimens must eat at a certain time after the injection to avoid hypoglycemia.

- **Patients taking a fixed dose of rapid-acting insulin with meals:** Rapid-acting insulin, such as aspart (NovoLog), lispro (Humalog), and glulisine (Apidra), begins working within 10 to 20 minutes of injection, peaks within 40 to 50 minutes, and has a duration of action of three to five hours. By eating a predetermined amount of carbohydrate with a fixed dose of rapid-acting insulin, patients can control or manage postmeal blood glucose levels.

Advanced Carb Counting

Instead of being based on a structured approach, advanced carbohydrate counting involves matching the amount of carbohydrate consumed with an appropriate dose of insulin (usually rapid acting). The amount and type of carbohydrate can vary, allowing freedom of food choices. But with this freedom comes responsibility, and those patients who are taught advanced carbohydrate counting also should be taught good nutrition and calorie consciousness to avoid weight gain.

As part of counseling for advanced carbohydrate counting, RDs teach clients to match their rapid-acting mealtime insulin dose (or bolus) with their carbohydrate consumption based on an insulin-to-carbohydrate ratio (ICR) and to adjust the bolus according to the grams of carbohydrate eaten. Dietitians work with clients to help them develop an understanding of the principles of the basal-bolus insulin concept to achieve optimal blood glucose levels.[4]

A normal-functioning pancreas constantly secretes insulin in two ways: basal and bolus. Basal insulin is secreted to counteract rises in blood glucose due to gluconeogenesis (formation of glucose in the liver) or hormone fluctuations caused by stressors, activity, or metabolic changes. Bolus insulin is secreted to counteract rises in blood glucose following meals.

Injected insulin is designed to mimic normal pancreatic function. Basal insulin given by injection is long-acting insulin taken once or twice per day. Some examples include NPH (Humulin N, Novolin N, Novolin NPH), glargine (Lantus), and detemir (Levemir). This type of insulin works to counteract rises in blood glucose that occur independent of meal ingestion.

Bolus insulin is given by injection in relation to meals and counteracts the rise in blood glucose from food. Rapid-acting insulin aspart (NovoLog), lispro (Humalog), and glulisine (Apidra) are examples of bolus insulin. They begin working within 10 to 20 minutes of injection, peak within 40 to 50 minutes, and have duration of action of three to five hours. Regular insulin (Humulin R) also is used as a bolus insulin, although it has a different mechanism of action, beginning to work in 30 minutes, peaking in 80 to 120 minutes, with duration of action of six to eight hours.

Matching bolus insulin to carbohydrate intake using an ICR is optimal for postmeal blood glucose management. Once an ICR is established, patients can adjust their mealtime bolus based on their carbohydrate intake.

Indications for Advanced Carb Counting
Advanced carbohydrate counting is indicated for the following groups:

- **Patients using multiple daily injection therapy:** This consists of injecting basal insulin one to two times per day and bolus insulin at meals. Advanced carbohydrate counting is best suited for this therapy since bolus insulin can be adjusted based on carbohydrate intake to maximize postmeal blood glucose management.

- **Patients willing to quantify their food intake:** Patients must count the total carbohydrate grams or carbohydrate choices eaten to dose their mealtime insulin adequately. Whether they count carbohydrate grams or choices is a matter of choice and at the educator's discretion.

- **Patients using insulin pump therapy:** Insulin pumps are designed to closely mimic normal pancreatic function. A three-day reservoir houses rapid-acting insulin that's delivered as basal and bolus. Basal is a constant infusion delivered 24 hours per day to mimic pancreatic basal insulin secretion. Bolus is given as needed or on demand in response to meals or to correct high blood glucose. The pump is programmed with the individual's ICR; the patient inputs the amount of carbohydrates eaten, and the pump calculates the bolus.

- **Patients who can perform basic math skills:** Individuals not using insulin pump therapy must calculate their bolus using their ICR. While those with poor math skills or who are intimidated by math can be taught to identify larger carb vs. smaller carb meals and inject predetermined bolus doses accordingly, this isn't an optimal approach and should be used at the educator's discretion after assessing patients' skills and abilities.

- **Patients willing to check blood glucose before and after meals:** A premeal blood glucose reading is necessary to determine whether additional insulin should be added to the bolus to cover premeal blood glucose excursions using a sensitivity factor (SF). Initially after starting advanced carbohydrate counting, blood glucose readings are taken following a meal (about two hours after) to assess the ICR. As the ICR is determined to be correct, postmeal readings can then be taken periodically as needed.

Calculating ICR and SF

Advanced carbohydrate counting involves calculating a patient's ICR and SF. ICR is the grams of carbohydrate counteracted by 1 unit of rapid-acting insulin, while SF is the amount by which 1 unit of rapid-acting insulin will lower blood glucose (measured as milligrams per deciliter).

Tables 1 and 2 demonstrate how to calculate ICR and SF. However, these are estimations; blood glucose results and patient experience are the best indicators of an individual's ICR and SF, so these calculations are designed to be starting points, and dietitians must consider their patients' individual needs.

Table 1: Calculating Insulin-to-Carbohydrate Ratio (ICR) Using the 500 Rule and Body Weight[4]

500 Rule	Based on Body Weight
500 ÷ total daily dose* = grams of carbohydrate covered by 1 unit of rapid-acting insulin (ICR) *Example: Patient taking 50 units/day* *500 ÷ 50 = 10* *In this example, it's estimated that 1 unit of rapid-acting insulin will cover the rise in blood sugar after the patient has eaten 10 g of carbohydrate.*	2.8 x body weight (in pounds) ÷ total daily dose* = ICR *Example: 160-lb patient taking 50 units/day* *2.8 x 160 ÷ 50 = 9* *In this example, it's estimated that 1 unit of rapid-acting insulin will cover the rise in blood sugar after the patient has eaten 9 g of carbohydrate.*

**Total amount of insulin taken in one day, including basal and bolus insulin*

Table 2: Calculating Sensitivity Factor Using the 1,700 Rule[4]

1,700 ÷ total daily dose = sensitivity factor

Example: Patient taking 50 units/day
1,700 ÷ 50 = 34

In this example, it's estimated that 1 unit of rapid-acting insulin will lower the patient's blood sugar by 34 mg/dL.

When initially calculating ICR and/or SF, it's best to err on the side of caution, basing recommendations on a conservative dose of insulin. It's imperative to frequently follow up with patients to assess whether adjustments are necessary.

Counseling Patients

Once a patient's carbohydrate needs have been determined, calories should be converted to carbohydrate, as described below. The optimal amount of calories coming from carbohydrate is a topic outside the scope of this article. There's no standard optimal mix of macronutrients for people with diabetes; the best mix of carbohydrate, protein, and fat will vary depending on the individual.

The Recommended Dietary Allowance (RDA) for carbohydrate (130 g/day) is a minimum requirement. Although appropriate calories to promote weight management goals are essential, macronutrient composition will depend on individual preferences and metabolic status (eg, lipid profile, renal function).[5]

Because incorrect insulin dosing can occur when patients are learning about and employing carbohydrate counting, they should be counseled on the signs, symptoms, and treatment of hypoglycemia.

Converting Calories to Carbohydrate
In this example, 45% of a 2,000-kcal/day recommendation will come from carbohydrate:

• 2,000 kcal x 0.45 = 900 kcal from carbohydrate

• 900 ÷ 4 = 225 g of carbohydrate (4 kcal/g of carbohydrate)

• 225 ÷ 15 = 15 carbs (15 g of carbohydrate = 1 carb choice)

As mentioned, whether patients are taught to count carbohydrate grams or choices should be based on their abilities and preferences. Some patients find it easier to round carbohydrate grams eaten to the nearest carb choice, while others prefer to take into account each gram of carbohydrate consumed. Ultimately, the carbohydrate grams or choices should be divided among meals and snacks based on patients' preferences and goals (see Table 3).

Table 3: Sample Meal Plan Based on 2,000 Kcal/Day

Meal	**Carbohydrate grams**	**Carbs**
Breakfast	45	3
Snack	30	2
Lunch	60	4
Dinner	60	4
Snack	30	2
Total	**225**	**15**

Once their meal plan has been developed, patients should be taught to identify carbohydrate foods and serving sizes. Carbohydrate foods are starches, sugars, and sugar alcohols, including grains, starchy vegetables (eg, corn, potatoes), fruits and fruit juices, milk and yogurt products, and sweets. Table 4 outlines carbohydrate foods and serving sizes. These serving sizes usually are measured after cooking. When a food label isn't readily available, patients should learn to use the serving sizes based on the Exchange Lists for Diabetes (see Table 4).

Table 4: Carbohydrate Foods, Serving Sizes, and Carbohydrate Grams Per Serving[6]

	Serving Size	Carbohydrate grams per serving
Starches	1 slice bread 1/2 cup cooked cereal 1/3 cup cooked rice or pasta 3/4 to 1 oz most snack foods	15
Starchy vegetables	3-oz baked potato 1/2 cup mashed potatoes, corn, dried beans, or green peas	15
Fruits and fruit juices	1/2 cup unsweetened fruit juice 1 small fresh fruit 1/2 cup canned unsweetened fruit 2 T dried fruit	15
Milk and yogurt	1 cup dairy milk 1 cup light soymilk 1 cup light or unsweetened yogurt	12
Sweets and other carbohydrates	2-inch square of cake, unfrosted (1 oz) 1 T jam or jelly 2 small cookies (2/3 oz)	15
Nonstarchy vegetables	1/2 cup cooked vegetables 1/2 cup vegetable juice 1 cup raw vegetables	5

Food Labels

Patients should learn how to use the Nutrition Facts panels whenever they're available. This information likely will be the most accurate estimation of the total carbohydrate content of particular foods.

However, patients must realize that the serving sizes listed on food labels aren't necessarily the same as those used in the Exchange Lists, and that it's unlikely and unnecessary to find foods with exactly 15 g of carbohydrate per serving. Moreover, many products assumed to contain one serving per package are listed as containing two or more servings. Patients should be cautioned that if they eat more than one serving as listed, they will need to increase accordingly the total carbohydrate grams as listed on the label. Dietitians should point out that the number in parentheses next to the serving size is the weight of the product at the serving size listed, as some patients may mistake this number for the carbohydrate grams.

Another common patient mistake includes counting only sugar grams or adding sugar grams to the total carbohydrate grams. Dietitians should inform patients that the total carbohydrate grams listed on the label include dietary fiber, sugars, starches, and sugar alcohols. All items indented under the total carbohydrate grams are included in the total carbohydrate number, and by counting the total carbohydrate grams, patients are taking into account all of the ingredients that will affect blood sugar.

Measuring Tools and Strategies

In basic carbohydrate counting, correctly estimating the number of carbohydrate grams eaten ultimately will determine a patient's calorie intake and can affect weight loss or gain. In advanced carbohydrate counting, correctly estimating carbohydrate eaten means the difference between a correct dose of insulin and postmeal hypo- or hyperglycemia.

Food models such as those sold by Nasco are made to represent foods in 15-g portion sizes, and they can help patients visualize how much of certain foods they should consume. Periodically, dietitians should use food models during follow-up sessions to reinforce portion sizes. Also, measuring cups are essential for quantifying intake, so dietitians may want to consider giving inexpensive measuring cups as rewards for patients who meet their nutritional goals.

Although it isn't always necessary to restrict carbohydrate intake to 15-g portions, knowing what a serving of carbohydrate food looks like is imperative to quantifying intake. Therefore, periodic reinforcement will be necessary.

A common error identified on follow-up visits is a patient's assumption that all carbohydrate foods are eaten in 15-g portions, which leads to under- or overestimation of carbohydrate intake. To avoid this problem, dietitians should teach patients to measure foods once per week (eg, measure on Tuesdays) to reinforce serving sizes and correct quantification. Another tactic is to have patients put their usual portion on their plate then use measuring cups to quantify it, sometimes revealing that a usual portion is two to three times more than previously thought.

Dietitians also can use food scales during counseling sessions. Although they're not necessary, patients can purchase an inexpensive basic food scale for less than $12, and it can help them understand portion sizes and measuring.

To save time and effort, patients also should keep a list or cheat sheet of the carbohydrate content of foods they usually eat. Also, many restaurants list the nutritional content of their dishes online, so patients can look up and choose their meals before eating out.

Another strategy is teaching patients to eyeball serving sizes by measuring a 15-g portion of carbohydrate food and putting it on their plates or into their cups or bowls. They should note how the measured portion looks on their dishes or where it falls in the bowls or cups. They will learn what one portion of the food looks like, and this can help quantify their food intake, especially when eating away from home. In addition, they can estimate portions by comparing them with the size of common household items (see Table 5).

Table 5: Estimating Portion Sizes Using Common Items

Item	Portion size
Palm of hand	3 to 4 oz
Thumb	1 T
Matchbook	1 T
Baseball	1 cup
Tennis ball	1 cup
Cupped hand	1/2 cup
Muffin or cupcake liner	1/2 cup

Calculating Sugar Alcohols

Sugar alcohols (polyols) are FDA-approved reduced-calorie sweeteners, including erythritol, isomalt, xylitol, and hydrogenated starch hydrolysates. Sugar alcohols contain one-half of the calories of other sweeteners (2 kcal/g) and have been shown to produce smaller increases in postprandial glycemia.

Dietitians can inform patients that it's appropriate to subtract one-half of the sugar alcohol grams from the total carbohydrate grams when calculating the carbohydrate content of foods containing sugar alcohols, though the usefulness of this practice is debated among professionals and patients, with some patients experiencing no benefit to doing this.[5] So consider it a tool to be taught on a need-to-know basis; if patients experience postmeal blood glucose excursions after eating foods that contain sugar alcohols, contemplate teaching them this tool.

Dietary Fiber

Dietary fiber is a carbohydrate but usually isn't digested. If a food contains more than 5 g of dietary fiber, it's appropriate to subtract one-half of the fiber grams from the total carbohydrate grams.[4] As with sugar alcohols, the usefulness of this practice is debated among professionals and patients, with some patients experiencing no benefit from doing so. This should be considered another need-to-know tool that can be taught to patients who may benefit from using it based on their eating patterns and blood glucose data.

Modifying ICR and SF

Out-of-range blood glucose levels indicate that ICR and SF modifications may be needed, but noninsulin dose variables first must be ruled out as the cause. Noninsulin variables affecting blood glucose include miscalculation of carbohydrate, delayed or missed boluses, incorrect bolus administration, hormonal affects, growth spurts, high fat or high protein content of meals, exercise and activity, and change of routine.

ICR and SF shouldn't be adjusted concurrently. Blood glucose levels should be assessed over 24 to 72 hours before making any changes, and levels should be measured again after three to seven days to assess accuracy.[7]

The following examples illustrate how to modify ICR and SF after ruling out noninsulin dose variables[7]:

Modifying ICR

1. If two-hour postmeal blood glucose is within 30 to 60 mg/dL of the premeal blood glucose, ICR is working correctly.

2. If two-hour postmeal blood glucose has increased by more than 60 mg/dL from premeal blood glucose, decrease ICR by 10% to 20% or 1 to 2 g/unit.

3. If two-hour postmeal blood glucose has increased less than 30 mg/dL from premeal blood glucose, increase ICR by 10% to 20% or 1 to 2 g/unit.

4. When evaluating ICR, instruct patients to eat low-fat meals with known carbohydrate content.

Consider the following example for a patient using an ICR of 15:

Premeal Blood Glucose	**Two-Hour Postmeal Blood Glucose**
109	172
121	185
104	173

Two-hour postmeal blood glucose increased by more than 60 g/dL from premeal blood glucose. Since noninsulin dose variables have been ruled out, the patient should decrease his ICR from 15 to 13 and the educator should follow up to reevaluate blood glucose to assess accuracy.

Modifying SF

1. If two-hour postcorrection blood glucose is halfway to goal blood glucose (and at goal by four hours), SF is working correctly.

2. If two-hour postcorrection blood glucose isn't halfway to goal (or at goal by four hours), decrease SF by 10% to 20%.

3. If two-hour postcorrection blood glucose is more than halfway to goal (or below goal by four hours), increase SF by 10% to 20%.

Patients should evaluate SF when blood glucose is elevated and no insulin has been given or food eaten for at least three hours, and they should avoid eating or drinking for four hours or until the evaluation is over.

Consider the following example for a patient using an SF of 50 with a blood glucose goal of 110 mg/dL:

Precorrection Blood Glucose	Two-Hour Postcorrection Blood Glucose	Four-Hour Postcorrection Blood Glucose
251	172	98
189	127	77
210	133	72

Two-hour postcorrection blood glucose is more than halfway to goal (and below the goal at four hours). Since noninsulin dose variables have been ruled out, the patient should increase SF to 60 and the educator should reevaluate blood glucose to assess accuracy.

Potential Consequences

Potential consequences of advanced carbohydrate counting include inappropriate calorie intake, insulin stacking with a risk of severe hypoglycemia, severe insulin resistance or sensitivity, and high fat intake.

Inappropriate Calorie Intake

Since advanced carbohydrate counting isn't a structured approach to eating, patients may eat too many calories if they're so focused on counting carbohydrate that they overlook the amount of protein and fat they're consuming. On the other hand, the process of evaluating and diligently counting carbohydrate naturally lends itself to an increased awareness, and many individuals begin to eat fewer calories.

Dietitians should routinely assess patients' weight and carbohydrate intake and provide guidance when necessary to reinforce total calorie intake. Patients should be taught to aim for a certain number of total calories per day or per meal and snacks or be taught to eat a certain number of servings from each food group per day or per meal and snack.

Insulin Stacking

Insulin stacking occurs when a dose of rapid-acting insulin is given while a previous insulin dose is still active, essentially "stacking" the second dose on top of the first dose with a potential for severe hypoglycemia. Insulin pumps help patients avoid this by taking into account active insulin when calculating a bolus dose.

Dietitians should teach patients who don't wear an insulin pump to take into account any active insulin when calculating an insulin dose. For example, patients shouldn't inject another dose of insulin until a certain period of time has elapsed (eg, four to six hours) or should inject only a partial dose if a previous dose is still active.

Insulin Resistance and Insulin Sensitivity

The calculations of ICR and SF presented earlier should be considered starting points and may or may not be accurate for individual patients' needs. Inaccurate ICR and/or SF will result in hypo- or hyperglycemia, so there are a few rules of thumb to consider: 1) upon initial calculation of ICR and/or SF, err on the side of caution and base recommendations on a conservative dose of insulin; 2) promptly and frequently follow up after initializing or modifying

any factor to assess for problems; and 3) modify factors based on blood glucose levels and patients' experiences.

High Fat Intake

The fat content of a meal can slow digestion and affect postmeal glycemia.4 Most insulin pumps have a square wave or dual wave bolus feature for these situations. A square wave bolus gives the entire bolus over a period of time, while a dual wave bolus gives part of the bolus initially and the remainder over a period of time.

For example, a patient's postmeal blood glucose level is elevated after eating a high-fat meal. Once noninsulin dose variables have been ruled out, patients should be instructed to program their insulin pumps to give part of the bolus initially and the remainder over 30 minutes to eight hours. Patients should check their blood sugar two hours after the extended portion is finished to assess accuracy.

A patient who doesn't wear an insulin pump can do this by splitting a meal bolus into two injections, one to be given initially and the other given at a later time, for example two to three hours after eating.

Freedom of Choice

In summary, carbohydrate counting is an option to provide patients with type 1 and 2 diabetes freedom to make choices about their food intake while keeping their postmeal blood glucose levels under control. Successful carbohydrate counting depends on reinforcing serving sizes and adequate carbohydrate counts of foods eaten, and appropriately fitting carbohydrate choices into an individual's meal plans.

When teaching advanced carbohydrate counting, dietitians should use the tools given to calculate ICR and SF as starting points; close follow-up and modifications based on patient need is necessary. In addition, potential consequences such as inappropriate calorie intake, insulin stacking, insulin resistance and sensitivity, and the effects of high-fat meals should be addressed as they arise.

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For patient handout go to:
http://www.todaysdietitian.com/pdf/courses/Halladvcarbcountingpatienthandout.pdf

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Examination

1. Basic carbohydrate counting emphasizes a _____ approach to carbohydrate intake, while advanced carbohydrate counting allows a _____ approach.
A. boundless, unlimited
B. unlimited, boundless
C. variable, structured
D. structured, variable

2. Patients who do which of the following are considered good candidates for advanced carbohydrate counting?
A. Control their diabetes with diet and exercise alone
B. Take a split-mixed insulin regimen
C. Are on multiple daily injection therapy
D. Take a fixed dose of insulin with meals

3. When initially calculating insulin-to-carbohydrate ratio (ICR) and/or sensitivity factor (SF), it's best to err on the side of caution, basing recommendations on a conservative dose of insulin.
A. True
B. False

Questions 4 and 5 refer to the following: Patient X has an insulin regimen of 20 units of glargine at bedtime and 6 units of aspart three times daily with meals.

4. What is Patient X's ICR based on the 500 rule?
A. 13
B. 15
C. 25
D. 28

5. What is Patient X's SF based on the 1,700 rule?
A. 45
B. 50
C. 85
D. 95

6. Which two techniques are debated among professionals and patients and should be considered only if patients will benefit from them based on their eating patterns and blood glucose data?
A. Subtracting sugar alcohols, subtracting dietary fiber
B. Addition and subtraction, calorie management
C. Insulin stacking, subtracting dietary fiber
D. Subtracting active insulin, subtracting sugar alcohols

7. Strategies to reinforce portion size estimations include which of the following?
A. Measuring cups, using a calculator, eyeballing serving sizes
B. Eyeballing serving sizes, measuring foods once per week, food models
C. Observing sugar grams, using a calculator, measuring foods once per week
D. Measuring cups, eyeballing serving sizes, observing sugar grams

8. When modifying ICR or SF, it's recommended that you do which of the following tasks first?
A. Evaluate blood sugar after a low-fat meal with a known carb content.
B. Evaluate blood sugar when no insulin has been given for at least three hours.
C. Evaluate blood sugar in three to seven days to confirm accuracy.
D. Rule out noninsulin dose variables.

Question 9 uses the following table based on a patient with an ICR of 1:20

Premeal Blood Glucose	Two-Hour Postmeal Blood Glucose
99	114
113	121
108	118

9. After evaluating the patient's ICR, what should you recommend?
A. No change
B. Increase ICR to 30
C. Decrease ICR to 18
D. Increase ICR to 22

10. When it's determined that high-fat meals are the cause of high postmeal blood sugar, patients can be taught to do which of the following?
A. Count half of the fat grams eaten and add them to the carbohydrate grams to calculate the meal bolus.
B. Count half of the fat grams eaten and subtract them from the carbohydrate grams to calculate the meal bolus.
C. Split a meal bolus into two injections, one given initially and the other given at a later time.
D. Use measuring cups, eyeball serving sizes, and observe sugar grams.