

Patient Education

Carb Counting Class, Diabetes Care Center



Carb Counting Class

Second Edition

UNIVERSITY OF WASHINGTON
MEDICAL CENTER
UW Medicine

Diabetes Care Center

Box 356176

1959 N.E. Pacific St. Seattle, WA 98195

206-598-4882

Patient Education

Carb Counting Class, Diabetes Care Center



Assessment: Group Visit

For Carb Counting Class

Name _____

Age _____ Height _____ Weight _____ pounds

Your Diabetes Management Doctor _____

Were you referred? Yes No

If yes, by whom? _____

Type of diabetes: Type 1 Type 2

How long have you had diabetes? _____

Have you taken a basic carb-counting class before? Yes No

Do you check your blood sugar? Yes No

If yes, how many times a day? _____

Are you currently taking any oral diabetes medications?

Yes No

If yes, which ones? _____

Are you currently taking insulin? Yes No

If yes, what kind? _____

How much? _____

Questions?

Call 206-598-4882

Your questions are important. Call your doctor or health care provider if you have questions or concerns. UWMC Clinic staff are also available to help at any time.

Diabetes Care Center
206-598-4882

Do you exercise? Yes No

If yes, what type of exercise? _____

Do you take vitamins or herbs? Yes No

If yes, please list: _____

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Blood Glucose Management

With carbohydrate counting

The foods you eat have different effects on your blood sugar. Healthy eating involves eating a variety of foods, including carbohydrates, protein, and fat. Protein and fat have a small and slow effect on blood sugar. Carbohydrates have a large and faster effect on blood glucose. Carbohydrate counting (“carb counting”) can give you an idea of how a meal will affect your blood sugar and insulin needs.

Nutrient Effect on Blood Glucose

Nutrient	Foods	Time	Kcal/Gm	Effect on Blood Glucose
Carbohydrate	<i>Simple:</i> Fruit juice, jam, honey, table sugar, milk, fruit <i>Complex:</i> Bread, rice, corn, potato, noodles, legumes, grains, beans, vegetables, peas, cereals, crackers	5 mins. - 3 hrs.	4	100%
Protein	Meat, poultry, fish, eggs, dairy products, lamb, tofu, tuna, cheese, peanut butter	3-6 hrs.	4	58%
Fat	<i>Unsaturated:</i> Liquid fats, vegetable oils (olive, corn, peanut, sunflower), nuts, margarine with liquid oil listed as first ingredient <i>Saturated:</i> Solid fats, animal fats, lard, shortening, palm and coconut oils	8 hrs.	9	10%
Alcohol	Dry wine, beer, vodka		7	Unpredictable

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The glycemic index (GI) is a way of determining the speed at which foods change into blood sugar. For more details, see *Glycemic Index* section, or see www.glycemicindex.com or www.mendosa.com to learn more about the glycemic index.

Carbohydrates come in several forms:

- **Simple, fast, or high glycemic index carbohydrates** change to blood sugar within 5 to 30 minutes.

Some types of *high glycemic index carbohydrates* are:

Watermelon	Bananas	Sugar	Potatoes*
White rice*	Pure apple juice	Corn	Syrup

- **Complex or low glycemic index carbohydrates** change to blood sugar within 1 to 3 hours.

Some types of *low glycemic index carbohydrates* are:

Legumes	Soy noodles*	Whole grains	Cherries
Basmati rice	Brown rice	Green beans	Blueberries

*The GI will vary based on the variety.

Proteins and Fats

To use carb counting to your best advantage, you must know if there are significant proteins and fats in a given meal. For example, if you are eating cereal and milk for breakfast, then you know the timing of digestion and absorption is quite different than a sausage, hashbrowns, and egg breakfast; or a 3-ounce chicken breast with rice and green beans for dinner versus a 6-ounce steak with fries and cheesecake.

- **Proteins** affect blood glucose over 3 to 6 hours. About 60% of proteins are changed to blood glucose.

Some types of *proteins* are:

Chicken	Nuts	Shrimp	Tofu
Beef	Eggs	Cheese	Fish

When you are looking for foods that affect blood sugar, do not forget proteins. They are not carbohydrates, but they will, over 3 to 6 hours, affect your blood glucose. In fact, a 3-ounce piece of meat, poultry, fish, or even cheese will affect your blood glucose the same as a piece of bread.

- **Fats** affect blood glucose over 8 to 10 hours. Only 10% of fats are changed to blood glucose. You will find that fats take many hours to digest and will slow down the process of other foods becoming blood glucose. For example, a low-fat meal of cereal, fruit and 2% milk may take only 1 to 1½ hours to become blood sugar, where pizza or salmon steak may take 3 to 6 hours or more to become blood sugar, even if there is the same amount of carbohydrates.

Some types of *fats* are:

Mono-unsaturated	Poly-unsaturated	Saturated
Avocado, olives, nuts	Margarine, mayonnaise, oils	Bacon, butter, coconut

In fact, there are several other ways that fats affect your blood sugar:

1. They slow your stomach from absorbing the simple or fast sugars by blocking the walls of the stomach. Just like peanut butter coats your mouth, fats can coat your stomach.
2. Fats also will slow down the process of digestion so that it could take twice as long to break down and digest a meal that had fried foods and fats than one that is low fat.
3. Fats also will slow the emptying of the stomach. This means foods get to the digestive enzymes later and break down to glucose later.
4. Unfortunately, fats also make you more insulin-resistant, so a fatty meal may need more insulin without your having eaten more carbohydrates.

Alcohol and Diabetes

An occasional mealtime drink is not harmful if your diabetes is in good control. **Learn about alcohol's effect on your blood sugar.** If you are going to drink, you will need to increase your blood glucose monitoring. This is especially important before bed. Keep in mind that alcohol can decrease your sugars by interfering with your liver's ability to provide glucose to you 2 to 8 hours after you have had a drink. Sometimes, this means a low blood sugar in the middle of the night if you have skipped your dinner protein.

- Alcohol has many calories (7 calories per gram; fat has 9), and few nutrients.
- Alcohol can make your blood sugar go too high or too low.
- ADA standards say 1 ounce of alcohol per day for females and 2 ounces per day for males is an appropriate limit.

Some recent research has shown that moderate amounts of alcohol can potentially be part of a healthy meal plan. **Too much alcohol and excessive drinking are still considered dangerous and unhealthy.** To learn more, see Section 5, *Alcohol and Diabetes*.

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Carb Counting Class, Diabetes Care Center
Blood Glucose Management

15 carbs =
15 grams glucose =
50 points blood
glucose =
1 unit insulin

Carb Counting

Using the exchange list, food labels, or even www.calorieking.com to figure out the carbohydrate content of the foods you are eating.

Exchange	Example	Grams Carbohydrates	Time to Glucose	Grams Glucose
1 starch	1 small potato, ½ cup pasta	15	1-3 hours	15
1 fruit	1 med. Apple, ½ banana	15	5-30 mins.	15
1 milk	1 cup milk, 1 cup yogurt	12	15-60 mins.	17
1 vegetable	1 cup raw veggies, ½ cup cooked veggies	5	15-60 mins.	5
1 meat	1 ounce meat or cheese	0	3-6 hours	4
1 fat	1 teaspoon margarine, 1 tablespoon cream cheese	0	8+ hours	1

The food groups that contain the greatest amount of glucose are the starches, fruits, and milk. Knowing the amount of carbohydrate in these foods can help you predict the effect of a given meal on your blood sugar. Then you can adjust your insulin as needed before the meal. Although it may be different for you, most times one serving of food (see above) provides about 15 grams of carbohydrate that becomes 15 grams of glucose, which then becomes about 50 points of blood glucose that you can measure on your meter. This 15 grams of carbohydrate or 50 points of blood glucose then need about one unit of insulin for coverage.

The **goal** of carb counting is to figure out how much insulin you need to cover your food and how much insulin you may need to correct your high blood glucose.

TAG or **Total Available Glucose** is another way of looking at the glucose from the proteins in foods affecting blood glucose 3 to 6 hours later. This is used in the final step of carb counting for fine tuning your blood sugars. You do not need to count these, but be aware of your total glucose. This is especially important if you are going to start on an insulin pump.

Target

To simplify carb counting, you must also know your target carbohydrate for each meal. Your target carbohydrate is the amount of carbohydrate you would typically eat at each meal based on your calorie needs and goals. If you eat more or less carbohydrate at a meal than your target carbohydrate, you can give more or less insulin.

Food Portions

Have you noticed that the size of muffins, candy bars, and soft drinks has grown over the years? How about portions of restaurant foods like pasta dishes, steaks, and French fries? As portion sizes grow, people tend to eat more than they need to stay healthy.

Larger food portions have more calories. Eating more calories than you need may lead to weight gain. Too much weight gain can put you at risk for weight-related diseases like Type 2 diabetes, heart disease, and some cancers.

Managing your weight calls for more than just choosing a healthful variety of foods like vegetables, fruits, grains (especially whole grains), beans, and low-fat meat, poultry, and dairy products. It also calls for looking at **how much** and **how often** you eat. This handout shows you how to use serving sizes to help you eat just enough for you.

A "portion" is how much food you choose to eat, whether in a restaurant, from a package, or in your own kitchen. A "serving" is a standard amount set by the U.S. Government, or sometimes by others for recipes, cookbooks, or diet plans.

How do I know how big my portions are?

The portion size that you are used to eating may be equal to 2 or 3 standard servings. For instance, a Nutrition Facts label for cookies may show the serving size is 2 cookies (see "Using Food Labels" on page 9 of this section). If you eat 4 cookies, you are eating 2 servings and double the calories, fat, and other nutrients in a standard serving.

To see how many servings a package contains, check the "servings per container" listed on the Nutrition Facts label. You may be surprised to find that small containers often have more than one serving inside.

Learning to recognize standard serving sizes can help you judge how much you are eating. When cooking for yourself, use measuring cups and spoons to measure your usual food portions and compare them to standard serving sizes from Nutrition Facts labels for a week or so. Put the measured food on a plate before you start eating. This will help you see what one standard serving of a food looks like compared to how much you normally eat.

Another way to keep track of your portions is to use a food diary. Writing down when, what, how much, where, and why you eat can help you be aware of the amount of food you are eating and the times you tend to eat too much. The chart on the next page shows what 1 day of a person's food diary might look like.

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Carb Counting Class, Diabetes Care Center
Blood Glucose Management

After reading the food diary, you can see that this person chose sensible portion sizes for breakfast and for lunch. She ate to satisfy her hunger. She had a large chocolate bar in the afternoon for emotional reasons – boredom, not in response to hunger. **If you tend to eat when you are not hungry, try doing something else, like taking a break to walk around the block or call a friend, instead of eating.**

By 8 p.m., this person was very hungry and ate large portions of higher-fat, higher-calorie foods. If she had made an early evening snack of fruit or pretzels, she might have been less hungry at 8 p.m. and eaten less. She also may have eaten more than she needed because she was at a social event, and was not paying attention to how much she was eating. **Through your diary, you can become aware of the times and reasons you eat too much, and try to make different choices in the future.**

Sample Record

Daily Food Record for Thursday, January 13

Time	Food	Amount	Place	Hunger/Reason
8 a.m.	Coffee, black	6 oz.	Home	Slightly hungry
	Banana	1 medium		
	Low-fat yogurt	1 cup		
1 p.m.	Turkey and cheese sandwich on whole wheat bread with mustard, tomato, and lettuce	3 oz. turkey, 1 slice American cheese, 2 slices bread	Work	Hungry
	Potato chips, baked	1 small bag, ½ oz.		
	Water	16 oz.		
3 p.m.	Chocolate bar	King size (4 oz.)	Work	Not hungry/bored
8 p.m.	Fried mozzarella sticks	4	Restaurant	
	Chicken Caesar salad	2 cups lettuce, 6 oz. chicken, 6 Tbsp. dressing, ¾ cup croutons		
	Breadsticks	2 large		
	Apple pie with vanilla ice cream	⅛ of 9-inch pie, 1 cup ice cream		
	Soft drink	6 oz.		

How do I control portions at home?

You do not need to measure and count everything you eat for the rest of your life – just long enough to recognize standard serving sizes. Try these other ideas to help you control portions at home:

- **Take a standard serving out of the package** and eat it off a plate instead of eating straight out of a large box or bag.
- **Avoid eating in front of the TV or while busy with other activities.** Pay attention to what you are eating and fully enjoy the smell and taste of your foods.
- **Eat slowly** so your brain can get the message that your stomach is full.
- **Take seconds of vegetables or salads** instead of higher-fat, higher-calorie parts of a meal such as meats or desserts.
- **When cooking in large batches, freeze food that you will not serve right away.** This way, you won't be tempted to finish eating the whole batch before the food goes bad. And you'll have ready-made food for another day. Freeze in single-meal-sized containers.
- **Try to eat 3 sensible meals at regular times** throughout the day. Skipping meals may lead you to eat larger portions of high-calorie, high-fat foods at your next meal or snack. Eat breakfast every day.
- **Keep snacking to a minimum.** Eating many snacks throughout the day may lead to weight gain.
- **When you do have a treat** like chips, cookies, or ice cream, eat only 1 serving, eat it slowly, and enjoy it!

Is getting more food for your money always a good value?

Have you noticed that it only costs a few cents more to get a larger size of fries or soft drink? Getting a larger portion of food for just a little extra money may seem like a good value, but you end up with more food and calories than you need.

Before you buy your next "value combo," be sure you are making the best choice for your health **and** your wallet. If you are with someone else, share the large-size meal. If you are eating alone, skip the special deal and just order what you need.

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Carb Counting Class, Diabetes Care Center
Blood Glucose Management

How can I control portions when eating out?

Research shows that the more often a person eats out, the more body fat he or she has. Try to prepare more meals at home. Eat out and get take-out foods less often. When you do eat away from home, try these tips to help you control portions:

- **Share your meal**, order a half-portion, or order an appetizer as a main meal.
- **Take half or more of your meal home.** You can even ask for your half-meal to be boxed up before you begin eating so you will not be tempted to eat more than you need.
- **Stop eating when you begin to feel full.** Focus on enjoying the setting and your friends or family for the rest of the meal.
- **Avoid large beverages, such as "supersize" soft drinks.** They have a large number of calories. Order the small size, choose a calorie-free beverage, or drink water with a slice of lemon.
- **When traveling, bring along nutritious foods** that will not spoil such as fresh fruit, small cans of fruit, peanut butter and jelly (spread both thin) sandwiches, whole grain crackers, carrot sticks, air-popped popcorn, and bottled water. If you stop at a fast-food restaurant, choose one that serves salads, or order the small burger with lettuce and tomato. Have water or nonfat milk with your meal instead of a soft drink. If you want French fries, order the small size.

Some information in this handout is reprinted with permission from National Institute of Diabetes & Digestive & Kidney Diseases Web site: <http://www.niddk.nih.gov/health/nutrit/pubs/justenuff/justenough.htm>.

Using Food Labels

1. Look at the food label below to find the number of grams of carbohydrate listed.

Sample Label for Macaroni and Cheese

Nutrition Facts	
Serving Size 1 cup (228g)	
Serving Per Container 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value	
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 1.5g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%
* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

2. What are the “heavy hitters” (ingredients) in the recipes you make? Identify the carbohydrate content by looking at the food labels. For more information, ask your dietitian at your next visit.

You can also figure out “Nutrition Facts” for the food you prepare from scratch. Go to “Links to Nutrient Analysis Resources” at:
<http://home.globaleyes.net/cycrd/nutranal.htm>.



Putting Insulin, Food, and Blood Sugars Together

For carbohydrate counting

Novolog/Humalog

Estimated Insulin-to-Carbohydrate Ratio* Based on Weight	
Weight (lb)	Ratio
100-109	1:18
110-129	1:17
130-139	1:16
140-149	1:15
150-169	1:14
170-179	1:13
180-189	1:12
190-199	1:11
200+	1:10

*1 unit of Novolog or Humalog insulin to grams of carbohydrate. *Adapted from Walsh J: Pumping Insulin. MiniMed Technologies, Sylmar, CA.*

In general, 1 unit of insulin will be needed for every 8 to 15 grams of carbohydrate. The level of insulin that is right for you may be different and vary during the day. For example, your body may be more resistant to insulin in the morning than during the rest of the day. Therefore, you may need up to twice as much insulin for carbohydrate at breakfast than at lunch or dinner. Your body size or fat-to-muscle ratio can also make quite a difference. For a larger-than-average person, 1 unit of insulin may only cover 8 to 9 grams of carbohydrate. The chart at the right can help you estimate the amount of insulin you need to cover a given amount of carbohydrate.

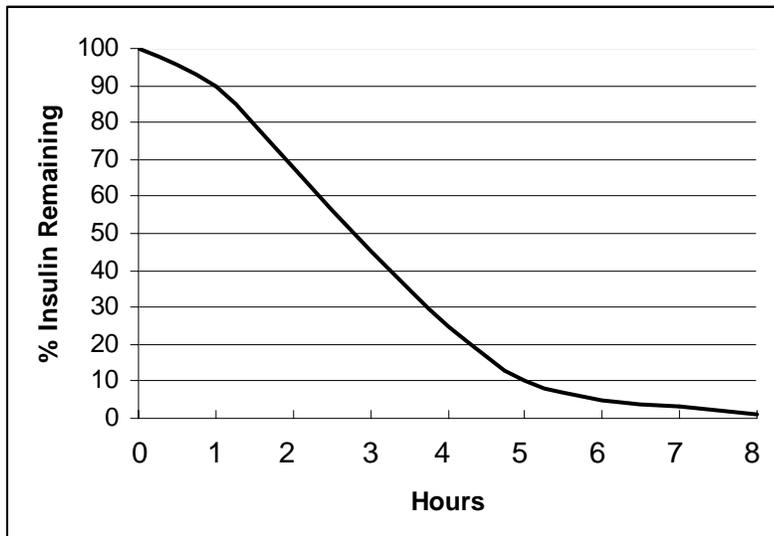
Calculating the amount of insulin needed for a meal is as easy as dividing the grams of carbohydrate covered by a single unit of insulin into the carbohydrate count of the meal.

Example:

A 125-pound female has a dinner of a large baked potato (30 grams of carb), a cup of cooked string beans (10 grams of carb), a 4-ounce chicken breast (0 carb but 16 gm glucose effect), and a cup of milk (12 grams of carb but 17 grams glucose). Her estimated insulin-to-carbohydrate ratio is 1:17 for Humalog. Therefore, she would need 3 units of Humalog insulin to cover her meal. $(30+10+12=52 \text{ gm carb}; 52/17=3 \text{ units for Humalog})$. Note that the glucose effect from the chicken breast and milk was not included in this calculation. This is because these foods change to glucose over a long period of time and combinations of Humalog and Regular insulin may be more effective if you are eating a higher fat and/or higher protein meal.

There are many factors that could affect the decisions about timing and amount of insulin, so be sure you discuss this further with your dietitian. Counting the TAG as well as the carbohydrates may give you a more exact idea of your insulin needs at mealtime. However, we suggest you begin simply by counting *only the carbohydrates* and work up to accounting for the glucose consumed from other sources.

Insulin Disappearance Curve



Insulin lispro (Humalog) and insulin aspart (Novolog)
“insulin action” disappearance curves.

Measuring Success

Checking your blood glucose before and after meals can help you fine-tune your insulin-to-carbohydrate ratio. If your blood glucose is above or below your target level before a meal, you will need to make insulin adjustments to correct for this, as well as estimate the amount of insulin needed for your meal. You will then add these two numbers together to determine the amount of insulin needed before meals.

For carb counting, keep in mind these issues:

- If using **Regular** instead of Humalog insulin, check your blood glucose at 90 minutes to 2 hours after the meal.
- If using a combination of **Regular and Humalog**, you will need to check both times (45 to 60 minutes, and 90 to 120 minutes post-meal) to measure the accuracy of insulin ratios.
- **Humalog** peaks in 45 to 60 minutes and is gone in about 6 hours, so you will need to take insulin every time you want a snack that has more than 2 to 5 grams of carbohydrate.
- You can use **Humalog or Novolog** every 3 hours to correct your blood glucose, but you must be willing to monitor your blood glucose more often. You will also need to consider decreasing the amount of insulin you take if dosing less than 5 to 6 hours since last injection. See “Insulin Stacking” on page 2 and “Insulin Disappearance Curve” at the top of this page.

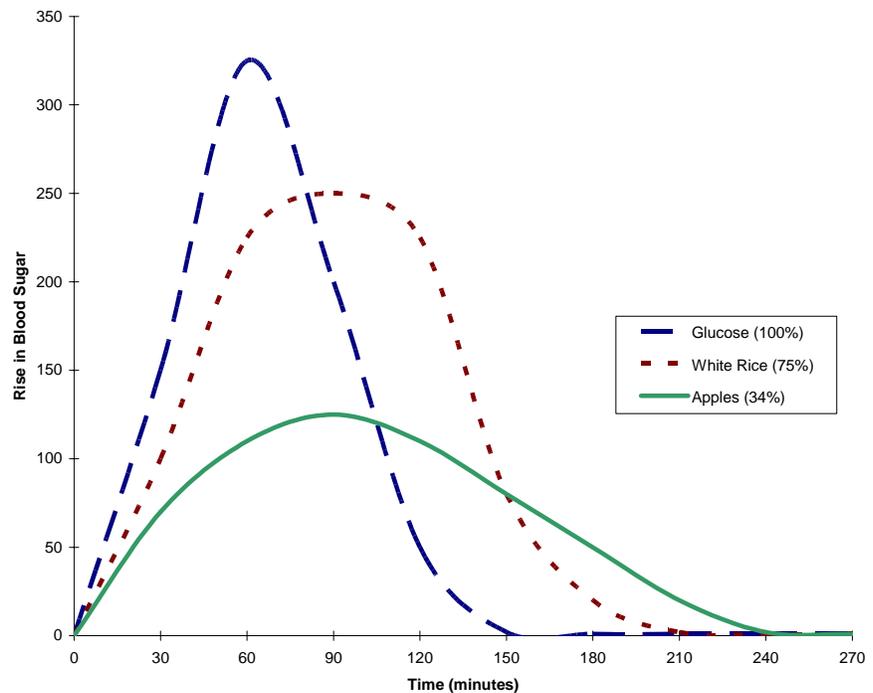


Glycemic Index

What is the glycemic index?

The glycemic index (GI) compares the impact on blood sugar levels of the carbohydrate in foods to an equivalent amount of glucose, usually 100 grams. This change is compared to the change in blood glucose after eating 100 grams of glucose or white bread. The results are shown as a percent of the glucose or white bread.

Rise in Blood Sugar vs. Time



In the example in the chart above, a group of people were given 100 grams glucose. Blood sugars were measured and values charted.

The same group was given 100 grams of carbohydrate from white rice. Blood sugars were measured and values charted.

The GI of white rice is given as a percentage of the glucose curve, in this case, 75%. The same procedure was used for a 100-gram carbohydrate servings of apples (GI 34%).

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Carb Counting Class, Diabetes Care Center
Glycemic Index

Food that lead to the best glycemic control have a GI of less than 50%.

GI is not intended to be used in isolation, but rather can and should be used in conjunction with other food and nutrition strategies such as total amount of carbohydrate, fat, and protein intake, and portion size.

To learn more about the glycemic index, visit these Web sites:

- www.glycemicindex.com
- www.mendosa.com

What is glycemic load?
Glycemic load considers both the amount of carbohydrate eaten as well as the glycemic index. While the GI provides a ranking of foods based on their blood glucose response, it does not take into account the effect of a typical amount of carbohydrate in a food portion on glycemia.

In an effort to improve the reliability of predicting the glycemic response of a given diet, a formula is used:

Glycemic load = grams carbohydrate X glycemic index

Glycemic Load

<p>100% Glucose</p> <p>80-89% Cornflakes Carrots Parsnips Potatoes (instant mashed) Maltose Honey</p> <p>70-79% Bread (whole meal) Millet Rice (white) Weetabix Broad beans (fresh) Potato (new) Swede</p> <p>60-69% Bread (white) Rice (brown) Muesli Shredded Wheat Ryvita Water Biscuits Beetroot Bananas Raisins Mars Bars</p>	<p>50-59% Buckwheat Spaghetti (white) Sweet corn All-bran Digestive biscuit Oatmeal biscuit “Rich tea” biscuit Peas (frozen) Yam Sucrose Potato chips</p> <p>40-49% Spaghetti (whole meal) Porridge oats Potato (sweet) Beans (canned navy) Peas (dried) Oranges Orange juice</p>	<p>30-39% Butter beans Haricot beans Black-eyed peas Chick peas Apples (Golden Delicious) Ice cream Milk (skim or whole) Yogurt Tomato soup</p> <p>20-29% Kidney beans Lentils Fructose</p> <p>10-19% Soy beans Soy beans (canned) Peanuts</p>
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Section 3 – Page 4

Carb Counting Class, Diabetes Care Center
Glycemic Index

Abbreviated Low Glycemic Index Food List

Blood glucose is best when choices include foods with a glycemic index less than 50%. Paying attention to GI in food and choosing foods with a GI less than 50% will help you improve your blood glucose levels and the quality of your diet. This is because low-GI foods are generally less processed and have a higher fiber content. Changing your diet to include low-GI foods is healthy for your heart as well.

Legumes

Serving size = ½ cup cooked or as indicated (15-20 grams carbohydrate, 100 calories)

Yellow and green split peas	Hummus ¼ cup
All beans: garbanzo, pinto/refried, kidney, black, lima, cannelloni, navy, mung	Red and green lentils
Soy: green beans, tempeh ½ cup	Bean soups ¾ cup

Non-Starchy Vegetables

Serving size = ½ cup cooked (5 grams carbohydrate, 25 calories)

Asparagus	Eggplant
Artichoke	Green beans
Bamboo shoots	Greens: bok choy, Swiss chard, kale, collard greens, watercress, dandelion
Bean sprouts	Lettuce/mixed greens: Romaine, red and green leaf, spinach, arugula
Broccoli	Mushrooms
Brussels sprouts	Radishes
Cauliflower	Salsa, unsweetened
Bell peppers	Snow peas
Celery	Sprouts
Cabbage: red, green, Chinese	Tomatoes
Chives, onion, leeks, garlic	Zucchini
Cucumber	

Starchy Vegetables

Serving size = ½ cup cooked, 1 cup raw, or as indicated (15 grams carbohydrate, 80 calories)

Carrots, beets (1½ cups)	Sweet potatoes or yams (½ medium)
Squash: acorn, butternut, winter	Yukon gold new potato (80 calories)

Concentrated Protein Sources

Serving size = 3 oz. (after cooking) or as indicated (150 calories)

Eggs: 2 whole or $\frac{2}{3}$ cup egg substitute	Ricotta: $\frac{1}{2}$ cup
Fish, shellfish, chicken breast, turkey, lean leg of lamb, lean pork, lean beef	Parmesan cheese: 4 Tbsp. grated
Elk or buffalo: 4 oz.	Tofu: 8 oz. or 1 cup
Nonfat cottage cheese: $\frac{3}{4}$ oz.	Soy burger: 4 oz.

Oils

Serving size as indicated (0 grams carbohydrate, 45 calories)

Expeller cold-pressed olive, canola, walnut and sesame oils: 1 tsp.	Ripe or green olives: 10 medium
Flax seed oil (keep refrigerated): 1 tsp.	Tofu mayonnaise: 1 Tbsp.
Mayonnaise made with canola oil: 1 Tbsp.	Avocado: $\frac{1}{8}$ whole

Nuts and Seeds

Serving size = 10-12 whole almonds, cashews, or hazelnuts; 2 Tbsp. seeds; 7-8 walnut or pecan halves (0 grams carbohydrate, 100 calories)

Nuts (almonds, hazelnuts, pecans, walnuts)
Seeds (sunflower, pumpkin, sesame)
Nut butter (from nuts above): 1 Tbsp.

Fruits

Serving size = 1 whole fruit or $\frac{1}{2}$ cup canned in juice or water, or $\frac{1}{2}$ cup sliced; berries and melons 1 cup; or as indicated (15 grams carbohydrate, 60 calories)

Apple	Melons – except watermelon
Apricot (2)	Nectarine
Berries-all	Papaya ($\frac{1}{2}$)
Cherries (12)	Peach
Figs, fresh (2)	Pear
Grapes (12)	Plum (2)
Grapefruit ($\frac{1}{2}$)	Orange
Kiwi fruit (2)	Star fruit (2)
Mandarin orange, tangerine (2)	



Total Available Glucose Values of Common Foods

For carbohydrate counting

Here is a list of the nutritional values of common foods, their grams of carbohydrates and total available glucose (TAG) for the serving size listed. TAG accounts for the glucose made available by protein. Keep in mind, 58% of each gram of protein in a meal turns to glucose within 3 to 6 hours. If the meal contains a lot of fat, it may take even longer. See information about protein and fats on page 2 of Section 1, *Blood Glucose Management*, to learn more.

If a food you eat is not listed in this section, your dietitian can help you find information about its nutritional values.

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Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods

Starch Group	Serving Size	Gm Carb/TAG
Cereals, Grains, Pasta		
Bran cereals, concentrated	1/3 cup	15
Bran cereals, flaked (such as Bran Buds, All Bran)	1/2 cup	15
Bulghur (cooked)	1/2 cup	15
Cooked cereals	1/2 cup	15
Cornmeal (dry)	2 1/2 Tbsp.	15
Grapenuts	3 Tbsp.	15
Grits (cooked)	1/2 cup	15
Other ready-to-eat unsweetened cereals	3/4 cup	15
Pasta (cooked)	1/2 cup	15
Puffed cereal	1 1/2 cup	15
Rice, white or brown (cooked)	2/3 cup	30
Shredded wheat	1/2 cup	15
Wheat germ	3 Tbsp.	15
Oat bran	3 Tbsp.	15
Dried Beans, Peas, Lentils		
Beans and peas (cooked) (such as kidney, white, split, black-eyed)	1 cup	45
Lentils (cooked)	1 cup	45
Baked beans	1 cup	60
Starchy Vegetables		
Corn	1/2 cup	15
Corn on the cob, 6" long	1	15
Lima beans	1/2 cup	15
Peas, green (canned or frozen)	1/2 cup	15
Plantain	1/2 cup	15
Potato, baked, small	3 oz.	15
Potato, mashed	1/2 cup	15
Squash, winter (acorn, butternut)	3/4 cup	15
Yam or sweet potato, plain	1/3 cup	15

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*Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods*

Lean Meat and Substitutes Group	Serving Size	Gm Carb	TAG
Beef			
USDA good or choice grades of lean beef – such as round, sirloin and flank steak; tenderloin, chipped beef	1 oz.	0	4
Pork			
Lean pork – such as fresh ham; canned, cured or boiled ham; Canadian bacon; tenderloin	1 oz.	0	4
Veal			
Chops and roasts – all cuts are lean except for veal cutlets (ground or cubed)	1 oz.	0	4
Poultry			
Chicken, turkey, Cornish hen (without skin)	1 oz.	0	4
Seafood			
All fresh and frozen fish	1 oz.	0	4
Crab, lobster, scallops, shrimp, clams (fresh or canned in water)	2 oz.	0	4
Oysters, medium	6	0	4
Tuna (canned in water)	¼ cup	0	4
Herring (uncreamed or smoked)	1 oz.	0	4
Sardines, medium (canned)	2	0	4
Wild Game			
Venison, rabbit, squirrel	1 oz.	0	4
Pheasant, duck, goose (without skin)	1 oz.	0	4
Cheese			
Cottage cheese (all)	¼ cup	0	4
Grated parmesan	2 Tbsp.	0	4
Diet cheeses (with less than 55 calories per oz.)	1 oz.	0	4
Other			
95% fat-free luncheon meat	1 oz.	0	4
Egg whites	3	0	4
Egg substitutes (with less than 55 calories per ¼ cup)	¼ cup	0	4

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Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods

Medium-fat Meat and Substitutes Group	Serving Size	Gm Carb	TAG
Beef			
Most beef products fall into this category – all ground beef, roasts (rib, chuck, rump), cubed, Porterhouse, T-bone, and meatloaf	1 oz.	0	4
Pork			
Most pork products fall into this category – chops, loin roast, Boston butt, cutlets	1 oz.	0	4
Lamb			
Most lamb products fall into this category – chops, leg, roast	1 oz.	0	4
Veal			
Cutlet (ground or cubed, unbreaded)	1 oz.	0	4
Poultry			
Chicken (with skin), domestic duck or goose (well-drained of fat), ground turkey	1 oz.	0	4
Fish			
Tuna (canned in oil and drained)	¼ cup	0	4
Salmon (canned)	¼ cup	0	4
Cheese			
Skim or part-skim milk cheese such as Ricotta	¼ cup	0	4
Mozzarella	1 oz.	0	4
Diet cheeses (with 56-80 calories per ounce)	1 oz.	0	4
Other			
86% fat-free luncheon meat	1 oz.	0	4
Egg (high in cholesterol, limit to 3 per week)	1	0	4
Egg substitutes with 56-80 calories per ¼ cup	¼ cup	0	4
Tofu (2½" x 2¾" x 1")	4 oz.	0	4
Liver, heart, kidney, sweetbreads (high in cholesterol)	1 oz.	0	4

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*Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods*

High-fat Meat and Substitutes Group	Serving Size	Gm Carb	TAG
Beef			
Most USDA prime cuts of beef such as ribs, corned beef	1 oz.	0	4
Pork			
Spare ribs, ground pork, pork sausage (patty or link)	1 oz.	0	4
Lamb			
Patties (ground lamb)	1 oz.	0	4
Seafood			
All fried fish products	1 oz.	0	4
Cheese			
All regular cheeses – such as American, bleu, cheddar, Monterey Jack, Swiss	1 oz.	0	4
Other			
Luncheon meats – such as bologna, salami, pimento loaf	1 oz.	0	4
Sausage such as Polish, Italian	1 oz.	0	4
Knockwurst, smoked	1 oz.	0	4
Bratwurst	1 oz.	0	4
Frankfurter – turkey or chicken (10 per lb.)	1	0	4
Peanut butter (contains unsaturated fat)	1 Tbsp.	0	4
<i>Count as 1 high-fat meat plus 1 fat exchange:</i> Frankfurter – beef, pork, or combination	1	0	4

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Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods

Milk Group	Serving Size	Gm Carb	TAG
Skim and Very Lowfat Milk			
Skim milk	1 cup	12	17
1-2% milk	1 cup	12	17
1% milk	1 cup	12	17
Lowfat buttermilk	1 cup	12	17
Evaporated skim milk	½ cup	12	17
Dry nonfat milk	⅓ cup	12	17
Plain nonfat yogurt	8 oz.	12	17
Lowfat Milk			
2% milk	1 cup	12	17
Plain lowfat yogurt (with added nonfat milk solids)	8 oz.	12	17
Whole Milk			
The whole milk group has much more fat per serving than the skim and lowfat groups. Whole milk has more than 3¼% butterfat. Try to limit your choices from the whole milk group as much as possible.			
Whole milk	1 cup	12	17
Evaporated whole milk	½ cup	12	17
Whole plain yogurt	8 oz.	12	17

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*Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods*

Vegetable Group	Serving Size	Gm Carb	TAG
Artichoke	½ medium	5	5
Asparagus	½ cup cooked	5	5
Beans (green, wax, Italian)	½ cup cooked	5	5
Bean sprouts	1 cup raw	5	5
Beets	½ cup cooked	5	5
Broccoli	½ cup cooked	5	5
Brussels sprouts	½ cup cooked	5	5
Cabbage, cooked	½ cup cooked	5	5
Carrots	½ cup cooked	5	5
Cauliflower	½ cup cooked	5	5
Eggplant	½ cup cooked	5	5
Greens (collars, mustard, turnip)	½ cup cooked	5	5
Kohlrabi	½ cup cooked	5	5
Leeks	½ cup cooked	5	5
Mushrooms, cooked	½ cup cooked	5	5
Okra	½ cup cooked	5	5
Onions	½ cup cooked	5	5
Pea pods	½ cup cooked	5	5
Peppers (green)	½ cup cooked	5	5
Rutabaga	½ cup cooked	5	5
Sauerkraut	½ cup cooked	5	5
Spinach, cooked	½ cup cooked	5	5
Summer squash (crookneck)	½ cup cooked	5	5
Tomato (one large)	1 cup raw	5	5
Tomato/vegetable juice	½ cup	5	5
Turnips	½ cup cooked	5	5
Water chestnuts	½ cup cooked	5	5
Zucchini, cooked	½ cup cooked	5	5

*Starch vegetables such as corn, peas, and potatoes are found on the Starch Group list.

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Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods

Fruit Group	Serving Size	Gm Carb	TAG
Fresh, Frozen, and Unsweetened Canned Fruit			
Apple (raw, 2" across)	1	15	15
Applesauce (unsweetened)	½ cup	15	15
Apricots (medium, raw)	4	15	15
Apricots (canned)	½ cup or 4 halves	15	15
Banana (9" long)	½	15	15
Blackberries*, blueberries* (raw)	¾ cup	15	15
Cantaloupe (5" across)	⅓ melon or 1 cup cubes	15	15
Cherries (large, raw)	12	15	15
Cherries (canned)	½ cup	15	15
Figs (raw, 2" across)	2	15	15
Fruit cocktail (canned)	½ cup	15	15
Grapefruit (medium)	½ grapefruit or ¾ cup segments	15	15
Grapes (small)	15	15	15
Honeydew melon (medium)	⅛ melon or 1 cup cubes	15	15
Kiwi (large)	1 kiwi	15	15
Mandarin orange	¾ cup	15	15
Mango (small)	½ mango	15	15
Nectarine* (1½" across)	1 whole	15	15
Orange (2½" across)	1 whole	15	15
Papaya	1 cup	15	15
Peach (fresh, 2¾" across)	1 whole or ¾ cup slices	15	15
Peaches (canned)	½ cup or 2 halves	15	15
Pear (fresh)	½ large or 1 small	15	15
Pear (canned)	½ cup or 2 halves	15	15
Persimmon (medium, native)	2 whole	15	15

* Contains 3 or more grams of fiber per serving.

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*Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods*

Fruit Group (continued)	Serving Size	Gm Carb	TAG
Fresh, Frozen, and Unsweetened Canned Fruit			
Pineapple (raw)	¾ cup	15	15
Pineapple (canned)	⅓ cup	15	15
Plum (raw, 2" across)	2	15	15
Pomegranate*	½ pomegranate	15	15
Raspberries* (raw)	1 cup	15	15
Strawberries* (raw, whole)	1¼ cup	15	15
Tangerine (1½" across)	2	15	15
Watermelon (cubes)	1¼ cup	15	15
Dried Fruit			
Apples*	4 rings	15	15
Apricots*	7 halves	15	15
Dates, medium	2½	15	15
Figs*	1½	15	15
Prunes, medium*	3	15	15
Raisins	2 Tbsp.	15	15
Fruit Juice			
Apple juice/cider	½ cup	15	15
Cranberry juice cocktail	⅓ cup	15	15
Grapefruit juice	½ cup	15	15
Grape juice	⅓ cup	15	15
Orange juice	½ cup	15	15
Pineapple juice	½ cup	15	15
Prune juice	⅓ cup	15	15

* Contains 3 or more grams of fiber per serving.

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Carb Counting Class, Diabetes Care Center
Total Available Glucose Values of Common Foods

Combination Food Group	Serving Size	Gm Carb	TAG
Casseroles, homemade	1 cup (8 oz.)	30	38
Cheese pizza, thin crust	¼ of 10" or 15 oz.	30	34
Chili with beans (commercial)	1 cup (8 oz.)	30	38
Chow mein (without noodles or rice)	2 cups (16 oz.)	25	33
Macaroni and cheese	1 cup (8 oz.)	30	34
Spaghetti and meatballs (canned)	1 cup (8 oz.)	30	34
Sugar-free pudding (made with skim milk)	½ cup	15	15
Soup			
Bean	1 cup (8 oz.)	20	24
Chunky, all varieties	10¾ oz. can	20	24
Cream (made with water)	1 cup (8 oz.)	15	15
Vegetable or broth	1 cup (8 oz.)	15	15
If beans are used as a meat substitute:			
Dried beans, peas, lentils (cooked)	1 cup	30	3

Occasional Food Group	Serving Size	Gm Carb	TAG
Angel food cake	1/12 cake	30	30
Cake, no icing	1/12 cake, or a 3" square	30	30
Cookies, small (1 3/4" across)	2	15	15
Frozen fruit yogurt	1/3 cup	15	15
Gingersnaps	3	15	15
Granola	1/4 cup	15	15
Granola bar, small	1/2 bar	15	15
Ice cream, any flavor	1/2 cup	15	15
Ice milk, any flavor	1/2 cup	15	15
Sherbet, any flavor	1/4 cup	15	15
Snack chips, all varieties	1 oz.	15	15
Vanilla wafers, small	6	15	15

Notes



Alcohol and Diabetes

There is no evidence that an occasional mealtime drink is harmful, if your diabetes is in good control. One serving of alcohol, a glass of wine or beer, or a single drink when consumed with a meal has little effect on well-controlled blood glucose.

However, if you have any of the medical conditions listed here, avoid alcohol. It can make these problems much worse.

Whiskey or Water?

If you have any of these medical conditions, you should avoid alcohol since it can cause problems:

- Gastritis or pancreatitis.
- Gastroparesis.
- Hypertriglyceridemia. (Alcohol increases triglycerides and high triglycerides increase your risk of heart disease.)
- Frequent hypoglycemia (low blood sugar).
- High blood pressure.
- Neuropathy.
- During pregnancy.

Further, if you do not eat regular meals and snacks, drinking alcohol may be a problem because it changes the blood glucose lowering effect of insulin, causing blood glucose to dip very low. And, as blood sugar falls, alcohol inhibits the body's ability to make its own glucose.

If you are taking certain oral hypoglycemic agents, alcohol may cause flushing, dizziness, and nausea. Eating usually relieves these sensations.

Avoid alcohol if you are trying to lose weight. It has many calories and few nutrients.

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Carb Counting Class, Diabetes Care Center
Alcohol and Diabetes

Guidelines

Follow these guidelines when using alcohol:

- If you drink, do so only with a meal.
- Drink slowly and in moderation. Most women should have no more than 1 drink and most men no more than 2 drinks each day.
- Avoid sweet, sugary drinks.
- Check blood sugar often. Alcohol can affect blood sugar up to 8 hours after drinking.
- Wear diabetes identification. A hypoglycemic reaction may resemble intoxication.

If you have an alcoholic drink, work it into your meal plan. If you take insulin, do not cut back on food in your meal plan.

- If you are using the exchange system, alcohol is counted as fat, fruit and/or bread. (See chart on page 3.)
- If you are counting calories, alcohol would be measured as calories.
- If you are counting carbohydrates, alcohol is measured as grams carbohydrate.

The chart on page 3 provides nutritional information on types of alcohol. This information can be used to work alcohol into your meal plan.

Some types of alcoholic beverages affect blood glucose levels more than others. The best types of alcoholic beverages to consume are:

- Non-sweet/dry wines.
- Distilled spirits mixed with low carbohydrate beverages (such as diet soda, club soda, low-calorie seltzer, and water).
- Light beer (preferable to regular beer – it has fewer calories, grams carbohydrate, and alcohol).

Poor choices of alcohol are:

- Port, liqueurs (they may be up to 50% sugar).
- Sweet wines.
- Distilled spirits mixed with high carbohydrate beverages (such as regular soda, fruit juice, and flavored syrups).

Alcohol	Serving Size	Approx. Calories	Carbohydrate (grams)	Number of Exchanges
Distilled Spirits (86 Proof)	1½ oz.	135	—	3 Fats
Dry Table Wine (12% alcohol)	5 oz.	90	—	2 Fats
Regular Beer (4.5% alcohol)	12 oz.	170	15	2 Fats & 1 Bread
“Light” Beer (3.5% alcohol)	12 oz.	120	8	2 Fats & ½ Fruit
Sweet Wine	4 oz.	85	5	2 Fats & ½ Starch
Wine Cooler	4 oz.	215	30	2 Fats & 2 Fruit
Champagne	4 oz.	100	4	2 Fats
Cordials, Liqueurs	1½ oz.	160	18	1 Fat & 1 Starch
Sweet Sherry, Port, Muscatel	2 oz.	90	7	1½ Fats & ½ Starch



Healthy Eating and Diabetes

For the best diabetes control:

- **Eat the right foods in the right amounts at about the same times every single day.**
- **Exercise.**
- **Monitor your blood sugar level.**
- **And, take your insulin.**

Healthy Choices

Healthy meals and snacks contain lots of carbohydrates. Foods high in carbohydrates are bread, cereal, rice, pasta, lentils and legumes, vegetables, fruits, milk, and yogurt. These foods also contain many vitamins and minerals as well as fiber, and are a main part of a healthy meal plan and good diabetes management.

Sugar, honey, jam, jelly, regular soda pop, cakes, pastries, and candy are also high in carbohydrates. These foods contain few vitamins and minerals and are often high in calories. All carbohydrates become glucose in blood within 5 minutes to 3 hours after eating. These foods have a big effect on blood glucose.

Carbohydrates should be the biggest part of your meal plan. The best ones to choose are those full of nutrients (vegetables, starches and fruits) instead of those empty in calories (cakes, pastries and candy).

Healthy eating also means not eating fatty and high cholesterol foods. These foods have been linked to atherosclerosis, the fatty build-up inside blood vessel walls. Atherosclerosis can lead to heart disease or stroke. People with diabetes are at two to three times greater risk of getting atherosclerosis.

Fat and cholesterol are found in many foods. To cut down on these:

- Choose lean cuts of meat. Remove any fat.
- Eat more chicken and turkey without the skin, and fish.
- Use nonfat or low-fat milk and milk products.
- Limit fried foods, gravies, cream sauces, butter, and margarine.

Good Control Through Healthy Eating

Along with choosing the right foods, watch the amount of food you eat. For good diabetes control you need to be consistent from day to day. Include carbohydrates at every meal. Plan your day to be sure you eat the right foods in the right amounts at about the same times every day.

A variety of foods that give a balance of carbohydrates and protein will help make sure there is glucose in your blood at the times your insulin is peaking (working the hardest), or during the times you are most active. Each meal should include a good source of carbohydrates and protein. This is the best balance for most people.

Samples of this type of balance include:

- Cereal and nonfat/low-fat milk.
- A turkey sandwich.
- Chicken or fish with pasta, rice, or potatoes.

A Meal Plan for You

Healthy eating goes hand-in-hand with your insulin therapy and glucose monitoring. Your dietitian will work with you to make a meal plan that matches your lifestyle and food habits. You will need to check your blood glucose often to be sure your insulin is right for your food and activity level.

Sometimes improved diabetes management results in unwanted weight gain. Select foods that are low in fat to manage your body weight. It may also help to increase the amount of exercise you do.

You and your dietitian can decide on the best meal plan to meet your needs. If your plan is not working well for you, you and your dietitian can meet to make changes. Healthy eating will help you manage your diabetes.

The USDA's new MyPyramid is a good basic meal plan. The dietary suggestions on pages 3 and 4 of this section are adapted from two USDA publications, "Anatomy of MyPyramid" and "MyPyramid Food Intake Patterns." These documents may be found on the Web at <http://www.mypyramid.gov/professionals/index.html>.

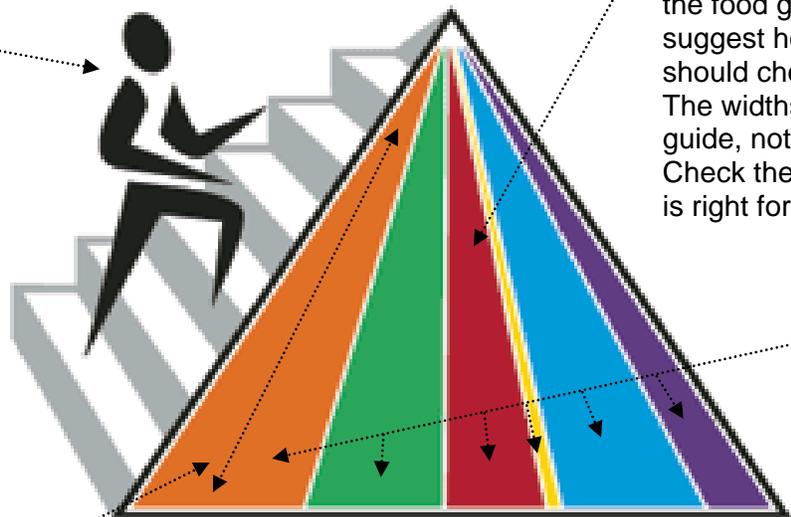
Anatomy of MyPyramid

One Size Doesn't Fit All

USDA's new MyPyramid symbolizes a personalized approach to healthy eating and physical activity. The symbol has been designed to be simple. It has been developed to remind consumers to make healthy food choices and to be active every day. The different parts of the symbol are described below.

Activity

Represented by the steps and the person climbing them, as a reminder of the importance of daily physical activity.



Proportionality

Shown by the different widths of the food group bands. The widths suggest how much food a person should choose from each group. The widths are just a general guide, not exact proportions. Check the Web site for how much is right for you.

Variety

Symbolized by the 6 color bands representing the 5 food groups of the Pyramid and oils. This illustrates that foods from all groups are needed each day for good health.

Moderation

Represented by the narrowing of each food group from bottom to top. The wider base stands for foods with little or no solid fats or added sugars. These should be selected more often. The narrower top area stands for foods containing more added sugars and solid fats. The more active you are, the more of these foods can fit into your diet.

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Carb Counting Class, Diabetes Care Center
Healthy Eating and Diabetes

MyPyramid Food Intake Patterns

The table below shows the suggested amounts of food to consume from the basic food groups and oils to meet recommended nutrient intakes at three different calorie levels. The table also shows the discretionary calorie allowance, which is the remaining amount of calories available if you have chosen low-fat, lean foods from the five major food groups. Discretionary calories can be used for higher calorie food choices within the basic food groups.

Daily Amount of Food from Each Group

Calorie Level *	1,600 Women and some older adults	2,200 Active women and most men	2,800 Active men and 15-18 year-old boys
Fruits	1½ cups per day	2 cups per day	2½ cups per day
Vegetables	2 cups per day	3 cups per day	3½ cups per day
Grains	5 oz. per day	7 oz. per day	10 oz. per day
Meat and Beans	5 oz. per day	6 oz. per day	7 oz. per day
Milk **	3 cups per day	3 cups per day	3 cups per day
Oils	5 tsp. per day	6 tsp. per day	8 tsp. per day
Discretionary Calorie Allowance	132	290	426

* These are the calorie levels if you choose low-fat, lean foods from the five major food groups, and use other foods such as oil, fats, and sweets sparingly.

** Women who are pregnant or breastfeeding, teenagers, and young adults to age 24 need **at least** three servings from the milk group per day.

Weekly Vegetable Subgroups

Vegetables in the table below are organized into five subgroups based on their nutrient content. Over a week, try to consume the amount listed from each subgroup as a way to get a good variety of important nutrients.

How Many Vegetables Are Needed Weekly

Calorie Level	1,600	2,200	2,800
Dark green vegetables such as romaine lettuce, spinach, kale	2 cups per week	3 cups per week	3 cups per week
Orange vegetables such as carrots, acorn squash, sweet potatoes	1½ cups per week	2 cups per week	2½ cups per week
Legumes such as black beans, kidney beans, tofu, lentils, split peas	2½ cups per week	3 cups per week	3½ cups per week
Starchy vegetables such as corn, peas, lima beans, potatoes	2½ cups per week	6 cups per week	7 cups per week
Other vegetables	5½ cups per week	7 cups per week	8½ cups per week

Tips to Help You Eat Whole Grains

At Meals

- To eat more whole grains, substitute a whole-grain product for a refined product – such as eating whole-wheat bread instead of white bread or brown rice instead of white rice. It's important to substitute the whole-grain product for the refined one, rather than adding the whole-grain product.
- Use whole grains in mixed dishes, such as barley in vegetable soup or stews and bulgur wheat in casseroles or stir-fries.
- Create a whole-grain pilaf with a mixture of barley, wild rice, brown rice, broth, and spices.
- Experiment by substituting whole wheat or oat flour for up to half of the flour in pancake, waffle, muffin, or other flour-based recipes. They may need a bit more leavening.
- Try rolled oats or a crushed, unsweetened whole-grain cereal as breading for baked chicken, fish, veal cutlets, or eggplant parmesan.
- Freeze leftover cooked brown rice, bulgur, or barley. Heat and serve it later as a quick side dish.

As Snacks

- Snack on ready-to-eat, whole-grain cereals such as toasted oat cereal.
- Try a whole-grain snack chip, such as baked tortilla chips.
- Popcorn, a whole grain, can be a healthy snack with little or no added salt and butter.

What to Look for on the Food Label

- Choose foods that name one of the following whole-grain ingredients first on the label's ingredient list:
 - Brown rice
 - Bulgur
 - Graham flour
 - Oatmeal
 - Whole-grain corn
 - Whole oats
 - Whole rye
 - Whole wheat
 - Wild rice

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Carb Counting Class, Diabetes Care Center
Healthy Eating and Diabetes

- Foods labeled with the words "multi-grain," "stone-ground," "100% wheat," "cracked wheat," "seven-grain," or "bran" are usually not whole-grain products.
- Color is not an indication of a whole grain. Bread can be brown because of molasses or other added ingredients. Read the ingredient list to see if it is a whole grain.
- Use the Nutrition Facts label and choose products with a higher % Daily Value (%DV) for fiber – the %DV for fiber is a good clue to the amount of whole grain in the product.
- Read the food label's ingredient list. Look for terms that indicate added sugars (sucrose, high-fructose corn syrup, honey, and molasses) and oils (partially hydrogenated vegetable oils) that add extra calories. Choose foods with fewer added sugars, fats, or oils.

Tips to Help You Eat Vegetables

In General

- Buy fresh vegetables in season. They cost less and are likely to be at their peak flavor.
- Stock up on frozen vegetables for quick and easy cooking in the microwave.
- Buy vegetables that are easy to prepare. Pick up pre-washed bags of salad greens and add baby carrots or grape tomatoes for a salad in minutes.
- Buy packages of vegetables such as baby carrots or celery sticks for quick snacks.
- Use a microwave to quickly "zap" vegetables. White or sweet potatoes can be baked quickly this way.
- Vary your veggie choices to keep meals interesting.
- Try crunchy vegetables, raw, or lightly steamed.
- Prepare more foods from fresh ingredients to lower sodium intake. Most sodium in the food supply comes from packaged or processed foods.

At Meals

- Plan some meals around a vegetable main dish, such as a vegetable stir-fry or soup. Then add other foods to complement it.
- Try a main dish salad for lunch. Go light on the salad dressing.
- Include a green salad with your dinner every night.
- Shred carrots or zucchini into meatloaf, and casseroles.
- Include chopped vegetables in pasta sauce or lasagna.
- Use pureed, cooked vegetables such as potatoes to thicken stews, soups, and gravies. These add flavor, nutrients, and texture.
- Grill vegetable kabobs as part of a barbecue meal. Try tomatoes, mushrooms, green peppers, and onions.

Make Vegetables More Appealing

- Many vegetables taste great with a dip or dressing. Try a low-fat salad dressing with raw broccoli, red and green peppers, celery sticks, or cauliflower.
- Add color to salads by adding baby carrots, shredded red cabbage, or spinach leaves. Include in-season vegetables for variety through the year.
- Include cooked dry beans or peas in flavorful mixed dishes, such as chili or minestrone soup.
- Decorate plates or serving dishes with vegetable slices.
- Keep a bowl of cut-up vegetables in a see-through container in the refrigerator. Carrot and celery sticks are traditional, but consider broccoli flowerettes, cucumber slices, or red or green pepper strips.

Tips to Help You Eat Fruits***In General***

- Keep a bowl of whole fruit on the table, counter, or in the refrigerator.
- Refrigerate cut-up fruit to store for later.
- Buy fresh fruits in season when they may be less expensive and at their peak flavor.
- Consider convenience when shopping. Buy packages of pre-cut fruit (such as melon or pineapple chunks) for a healthy snack in seconds. Choose packaged fruits that do not have added sugars.

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Carb Counting Class, Diabetes Care Center
Healthy Eating and Diabetes

At Meals

- At breakfast, top your cereal with bananas or peaches; add blueberries to pancakes.
- At lunch, pack a tangerine, banana, or grapes to eat, or choose fruits from a salad bar. Individual containers of fruits like peaches or applesauce are easy and convenient.
- At dinner, add crushed pineapple to coleslaw, or include mandarin oranges or grapes in a tossed salad.
- Make a Waldorf salad, with apples, celery, walnuts, and dressing.

Tips for Making Wise Calcium Choices

- Include milk as a beverage at meals. Choose fat-free or low-fat milk.
- If you usually drink whole milk, switch gradually to fat-free milk to lower saturated fat and calories. Try reduced fat (2%), then low-fat (1%), and finally fat-free (skim).
- If you drink cappuccinos or lattes – ask for them with fat-free (skim) milk.
- Add fat-free or low-fat milk instead of water to oatmeal and hot cereals.
- Use fat-free or low-fat milk when making condensed cream soups (such as cream of tomato).
- Have fat-free or low-fat yogurt as a snack.
- Make a dip for fruits or vegetables from yogurt.
- Make fruit-yogurt smoothies in the blender.
- Top cut-up fruit with flavored yogurt for a quick dessert.
- Top a baked potato with fat-free or low-fat yogurt.

For Those Who Choose Not to Consume Milk Products

- If you avoid milk because of lactose intolerance, the most reliable way to get the health benefits of milk is to choose lactose-free alternatives within the milk group, such as cheese, yogurt, or lactose-free milk, or to consume the enzyme lactase before consuming milk products.

- Calcium choices for those who do not consume milk products include:
 - Soy beverages, cereals, breads, or rice beverages (check label for calcium – not all products contain added calcium and vitamin D).
 - Canned fish (sardines, salmon with bones) soybeans and other soy products (soy-based beverages, soy yogurt, tempeh), some other dried beans, and some leafy greens (collard and turnip greens, kale, bok choy). The amount of calcium that can be absorbed from these foods varies.

Tips to Help You Make Wise Choices from the Meat and Beans Group

Go Lean with Protein

Start with a lean choice:

- The leanest beef cuts include round steaks and roasts (round eye, top round, bottom round, round tip), top loin, top sirloin, and chuck shoulder and arm roasts.
- The leanest pork choices include pork loin, tenderloin, center loin, and ham.
- Choose extra lean ground beef. The label should say at least "90% lean." You may be able to find ground beef that is 93% or 95% lean.
- Buy skinless chicken parts, or take off the skin before cooking.
- Boneless skinless chicken breasts and turkey cutlets are the leanest poultry choices.
- Choose lean turkey, roast beef, ham, or low-fat luncheon meats for sandwiches instead of luncheon meats with more fat, such as regular bologna or salami.

Keep it lean:

- Trim away all of the visible fat from meats and poultry before cooking.
- Broil, grill, roast, poach, or boil meat, poultry, or fish instead of frying.
- Drain off any fat that appears during cooking.
- Skip or limit the breading on meat, poultry, or fish. Breading adds fat and calories. It will also cause the food to soak up more fat during frying.
- Prepare dry beans and peas without added fats.
- Choose and prepare foods without high fat sauces or gravies.

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Carb Counting Class, Diabetes Care Center
Healthy Eating and Diabetes

Vary your protein choices:

- Choose fish more often for lunch or dinner. Look for fish rich in omega-3 fatty acids, such as salmon, trout, and herring. Some ideas are:
 - Salmon steak or filet
 - Salmon loaf
 - Grilled or baked trout
- Choose dry beans or peas as a main dish or part of a meal often. Some choices are:
 - Chili with kidney or pinto beans
 - Stir-fried tofu
 - Split pea, lentil, minestrone, or white bean soups
 - Baked beans
 - Black bean enchiladas
 - Garbanzo or kidney beans on a chef's salad
 - Rice and beans
 - Veggie burgers or garden burgers
 - Hummus (chickpeas) spread on pita bread

Tips for Increasing Physical Activity

Make Physical Activity a Regular Part of the Day

- Choose activities that you enjoy and can do regularly. Fitting activity into a daily routine can be easy – such as taking a brisk 10-minute walk to and from the parking lot, bus stop, or subway station. Or, join an exercise class. Keep it interesting by trying something different on alternate days.
- What's important is to be active most days of the week and make it part of daily routine. For example, to reach a 30-minute goal for the day, walk the dog for 10 minutes before and after work, and add a 10-minute walk at lunchtime. Or, swim 3 times a week and take a yoga class on the other days.
- Make sure to do at least 10 minutes of the activity at a time, shorter bursts of activity will not have the same health benefits. To be ready anytime, keep some comfortable clothes and a pair of walking or running shoes in the car and at the office.

More Ways to Increase Physical Activity

At home:

- Join a walking group in the neighborhood or at the local shopping mall. Recruit a partner for support and encouragement.
- Push the baby in a stroller.
- Get the whole family involved – enjoy an afternoon bike ride with your kids.
- Walk up and down the soccer or softball field sidelines while watching the kids play.
- Walk the dog – don't just watch the dog walk.
- Clean the house or wash the car.
- Walk, skate, or cycle more, and drive less.
- Do stretches, exercises, or pedal a stationary bike while watching television.
- Mow the lawn with a push mower.
- Plant and care for a vegetable or flower garden
- Play with the kids – tumble in the leaves, build a snowman, splash in a puddle, or dance to favorite music.

At work:

- Get off the bus or subway one stop early, and walk or skate the rest of the way.
- Replace a coffee break with a brisk 10-minute walk. Ask a friend to go with you.
- Take part in an exercise program at work or a nearby gym.
- Join the office softball or bowling team.

At play:

- Walk, jog, skate, or cycle.
- Swim or do water aerobics.
- Take a class in martial arts, dance, or yoga.
- Golf (pull cart or carry clubs).
- Canoe, row, or kayak.
- Play racquetball, tennis, or squash.

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Healthy Eating and Diabetes*

- Ski cross-country or downhill.
- Play basketball, softball, or soccer.
- Hand cycle or play wheelchair sports.
- Take a nature walk.

Most important – have fun while being active!



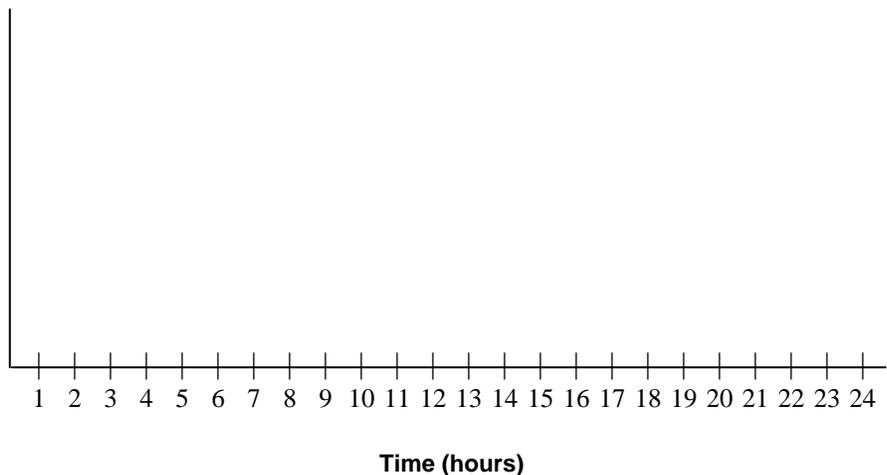
Calculating Mealtime Insulin Needs

Nutrient Effect on Blood Glucose

Review the chart on nutrient effect on blood glucose. (See Section 1, *Blood Glucose Management*.) What does this mean for you, considering your food choices and type of insulin?

Nutrient Effects

Blood Sugar
Response



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Carb Counting Class, Diabetes Care Center
Calculating Mealtime Insulin Needs

	What You Control	What You Can't Control
Your Body	Hydration Exercise Other:	Illness Hormones Medicines Stress Other:
Food/Drink	Amounts of food When you eat (timing) Kinds of carbohydrates Amounts of fat Balance of food choices Eating out at restaurants Alcohol Caffeine Other:	Eating out at restaurants Unknown recipes Traveling Other:

How Much Insulin to Take at Meals for Food

The First Step

The first step is to understand what we need to know.

- **Method 1: 1 unit of short-actin insulin ® for _____ grams of carbohydrate.**

How do you know how much insulin to take before a meal?

Insulin for Food – Humalog/Novolog

Estimated Insulin-to-Carbohydrate Ratio Based on Weight	
Weight (lb.)	Ratio
100-109	1:18
110-129	1:17
130-139	1:16
140-149	1:15
150-169	1:14
170-179	1:13
180-189	1:12
190-199	1:11
200+	1:10

Table adapted from Walsh J: *Pumping Insulin*, Mini/Med Technology, Sylmar, CA.

• **Method 2: 500 Rule for Carbohydrate-Insulin Ratio**

$$\frac{500}{\text{Total units of insulin you use per day}} = \text{___ grams of carbohydrate per unit of insulin}$$

Use the 500 rule to figure out the amount of insulin needed for carbohydrate ratio.

$$\frac{500}{\text{___ units of insulin per day}} = \text{___ grams of carbohydrate per unit of insulin}$$

Example: 500 divided by 50 = 10 grams carbohydrates per 1 unit of meal insulin.

Standard Insulin Therapy

Target Carbohydrate	Units of Insulin	Kind of Insulin
Breakfast: ___ grams		H/N/R
Lunch: ___ grams		H/N/R
Supper: ___ grams		H/N/R

Intensive Insulin Therapy

Insulin to Carbohydrate Ratio	Total Carbohydrate	Total Insulin Required (total grams carb/ratio)
Breakfast:	___ grams	
Lunch:	___ grams	
Supper:	___ grams	

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Carb Counting Class, Diabetes Care Center
Calculating Mealtime Insulin Needs

How Much Insulin to Take at Meals for Blood Sugar

Determine how much insulin to take to correct high blood sugar before a meal:

- Add up your meal insulin:

Breakfast _____

Lunch _____

Dinner _____

Total Meal Insulin _____

- Add up your long-acting insulin:

A.M. _____

P.M. _____

Total Basal Insulin _____

- Your total insulin:

Total Daily Insulin _____

Divide total into 1800 (see equation below).

$$\frac{1800}{\text{Total daily Insulin}} = \begin{array}{l} \# \text{ of points that} \\ \text{1 unit of insulin} \\ \text{will decrease} \\ \text{blood glucose} \end{array}$$

Notes:



Food Records

For carbohydrate counting

Here are blank “master copies” of two types of food records. Filling out a food record can help you become aware of eating patterns and guide you toward making better choices. It can also provide helpful instruction for the health care professionals involved in your care.

Sample Record

Daily Food Record for Thursday, January 13

Time	Food	Amount	Place	Hunger/Reason
8 a.m.	Coffee, black	6 oz.	Home	Slightly hungry
	Banana	1 medium		
	Low-fat yogurt	1 cup		
1 p.m.	Turkey and cheese sandwich on whole wheat bread with mustard, tomato, and lettuce	3 oz. turkey, 1 slice American cheese, 2 slices bread	Work	Hungry
	Potato chips, baked	1 small bag, ½ oz.		
	Water	16 oz.		
3 p.m.	Chocolate bar	King size (4 oz.)	Work	Not hungry/bored
8 p.m.	Fried mozzarella sticks	4	Restaurant	
	Chicken Caesar salad	2 cups lettuce, 6 oz. chicken, 6 Tbsp. dressing, ¾ cup croutons		
	Breadsticks	2 large		
	Apple pie with vanilla ice cream	⅛ of 9-inch pie, 1 cup ice cream		
	Soft drink	12 oz.		

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Carb Counting Class, Diabetes Care Center
Food Records

Daily Food Record for _____

Time	Food	Amount	Place	Hunger/Reason



Resources

Books and Web sites for information on carb counting

Books

1. *The Doctor's Pocket Calorie Fat and Carbohydrate Counter: Plus 170 Fast-Food Chains and Restaurants.* Borushek, Allan. Costa Mesa, CA: Family Health Publications, 2004.
2. *Carb Counter: A Clear Guide to Carbohydrates in Everyday Foods.* London: Collins, 2004.
3. *The Hugely Better Carbohydrate Counter.* Humphries, Carolyn. London: Foulsham, 2004.
4. *The New Glucose Revolution: The Authoritative Guide to the Glycemic Index: The Dietary Solution for Lifelong Health.* Brand Miller, Janette; Foster-Powell, Kaye., et al. New York, NY: Marlowe & Co., 2003.
5. *Barbara Kraus' Calories and Carbohydrates.* Kraus, Barbara. New York, NY: Signet, 2003.
6. *The Diabetes Carbohydrate and Calorie Counter.* Natow, Annette B, Heslin, Jo-Ann. New York: Pocket Books, 2003.
7. *Guide to Carbohydrate Counting: A Simple Meal-Planning Method for People with Diabetes.* Minneapolis: Fairview Publications, 2003.
8. *Concise Fat and Carbohydrate Counter.* Enderby: Arcturus, 2003
9. *The Ultimate Calorie Counter.* Buff, Sheila. New York, NY: St Martin's Press, 2002.
10. *The NutriBase Guide to Carbohydrates, Calories, and Fat in Your Food.* Ulene, Art. New York, NY: Avery, 2001.
11. *Complete Guide to Carb Counting.* Warshaw, Hope S. Alexandria, VA: American Diabetes Association, 2001.

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Web Sites

1. www.glycemicindex.com/
Home of the glycemic index (GI). Here you will find information on the glycemic index of foods, latest GI data, GI books, GI testing services and information on the GI symbol program.
2. www.mendoza.com/index.html
Comprehensive collection of diabetes information and resources.
3. www.calorieking.com
CalorieKing.Com
Comprehensive source about foods and recipes.
4. www.niddk.nih.gov/health/nutrit/nutrit.htm
Weight-control Information Network (WIN) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health, which is the Department of Health and Human Services' lead agency responsible for biomedical research on nutrition and obesity. Authorized by Congress (Public Law 103-43), WIN provides the general public, health professionals, the media, and Congress with up-to-date, science-based health information on weight control, obesity, physical activity, and related nutritional issues.

WIN answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and government agencies to coordinate resources about weight control and related issues.

Your Resources

Look at the list of resources listed in this section. Select one or two resource books or Web sites that you want to use, and list them here:

Patient Education

Carb Counting Class, Diabetes Care Center



Evaluation Form

For Diabetes Care Center education programs

Date _____

Class _____

Your honest opinions and feedback help us improve our education programs.

1. Did you learn something new and useful during your class? (*circle your answer*)

1	2	3	4	5
No new and useful information	Very little new and useful information	Some new and useful information	Quite a bit of new and useful information	Lots of new and useful information

2. Did your educator(s) present the information you were looking for? (*circle your answer*)

1	2	3	4	5
No – not at all satisfied	No – barely satisfied	Yes – somewhat satisfied	Yes – very satisfied	Yes – highly satisfied

3. What would you add to the class? _____

4. What would you delete from the class? _____

5. Would you recommend the class to your friends or family who have diabetes? (*circle your answer*)

Yes Maybe No

6. What I liked best about the class: _____

7. Other comments: _____
