Diabetic Diet – CHO Counting

Purpose
Carbohydrate counting is a method of meal planning that is based on the number of grams of CHO in food. Carbohydrate-rich foods are made up primarily of starch and the sugar glucose, which is the body’s main fuel source. Therefore, carbohydrates have the greatest impact on blood glucose levels. People with diabetes must pay close attention to the amount of carbohydrates they are consuming. The purpose of monitoring carbohydrate intake, tracking portion sizes and having set times for meals is to maintain stable blood glucose levels. Keeping within a healthy blood glucose range helps to avoid hypoglycemia, hyperglycemia and to prevent or delay the complications of diabetes. It is important for diabetics to monitor their dietary intake of carbohydrates, not cut them out from their diet. Eating consistent amounts of carbohydrate at meals and snacks can make carbohydrate counting a simpler and more effective method of meal planning.

Population
Both individuals with Type 1 and Type 2 diabetes need to monitor their carbohydrates. The amount of carbohydrate you should eat is based on several factors including: sex, weight, level of physical activity, medications (including insulin), and blood glucose goals. By eating the same amount of carbohydrate at each meal at approximately the same time each day, you will be able to better maintain proper blood glucose levels. A registered dietitian, diabetes educator, or other health care member can help you develop a meal plan that is right for you.

General Guidelines
Examples of carbohydrate-containing foods are grains such as bread and cereal, fruits and starchy vegetables such as potatoes, and dairy products. These foods provide important nutrients such as vitamins, minerals, and fiber for good health. Although foods like cake and cookies also contain carbohydrates, these foods are typically high in fat and calories and low in vitamins, minerals, and fiber. These foods may make it more difficult for you to manage your weight, therefore you should try to limit these and eat more whole grain breads and low-fat dairy products.

Carbohydrate Group (40-60% of your diet should be carbohydrate)
Starch
Fruit
Milk
Starchy Vegetables

Meat and Meat Substitute Group*
Lean
Fat group
*Meats and fats are not counted as carbohydrates, but they cannot be ignored because their calorie and fat content is still a large contribution to your total dietary intake.
Some common serving sizes are listed below, based on 15 grams of carbohydrate:

- 1 small piece of fresh fruit (4 oz)
- 1 slice of bread (1 oz)
- 1/2 cup of oatmeal
- 1/3 cup of pasta or rice
- 4-6 crackers
- 1/2 cup of black beans or starchy vegetable
- 2 small cookies
- 1/2 cup ice cream or sherbet
- 1 Tbsp syrup, jam, jelly, sugar or honey
- 2 Tbsp light syrup
- 6 chicken nuggets
- 1 cup of soup
- 1/4 serving of a medium French fry

### Three Levels of Carbohydrate Counting

#### Level 1: Basic Carbohydrate Counting Skills
- Knowing carbohydrate sources
- Knowing how to count grams of carbohydrate in foods
- Understanding the relationship between portion size and carbohydrate content
- Recording your usual carbohydrate intake and sharing it with an RD
- Determining target amounts of carbohydrates for meals and snacks determined

#### Level 2: Intermediate Carbohydrate Counting Skills
- Pattern management
  - Identify blood glucose patterns impacted by food, insulin, and PA
  - Identify and interpret patterns to make adjustments in diabetes regimens
- Rapid of short-acting insulins matched to carbohydrate content of usual meals
- Insulin doses adjusted when deviations from usual carbohydrate content are made
  - For every 15-20 g CHO added or subtracted from a meal, 1-2 units rapid- or short-acting insulin suggested.
  - Each person’s requirements should be individualized

#### Level 3: Advanced Carbohydrate Counting Skills
- Used by individuals on intensive insulin therapy
- Insulin adjusted on basis of ratio of grams of carbohydrate intake to doses of rapid or short-acting insulin
- RD calculates carbohydrate-to-insulin ratio for each meal
  - Uses food, insulin, blood glucose monitoring records
  - Ratios may vary from meal to meal, from workdays to weekend days, from exercise to non-exercise days, and they may change over time
- Periodic reevaluation is required
- Calculation of carbohydrate-to-insulin ratios
  - Grams of CHO eaten at a meal divided by number of units of rapid- or short-
    acting insulin necessary to meet blood glucose goals. For example:
  - 45 g CHO (3 CHO choices) at a meal and requires 5 units insulin
  - Ratio of 1 U insulin to 9 g CHO or 2 U insulin for every 1 carbohydrate choice

There may be need for food-specific insulin doses
Large amounts of meat and/or fat at a meal may require adjustment of insulin
administration after the meal instead of before the meal
Grams of fiber may be subtracted from total carbohydrate content of a food if it
contains >5 g fiber per serving, since fiber is not considered an available source

Education Material
How to measure grams of CHO:
CHOs are measured in grams
15 grams CHO = 1 CHO choice
Total CHO (grams) per day ÷ 15 grams CHO = number of CHO choices per day

Ideas for Compliance:
Making sure that an individual stays within a healthy blood glucose range will
prevent the chance of hypoglycemia, hyperglycemia, and many other risk factors.
If a person becomes hypoglycemic, they should be given ½ cup fruit juice, ½ cup soda, or
3-4 glucose tablets. If a person becomes hyperglycemic, they may need to adjust their
insulin regimen and/or see a physician if it gets too high, which could cause diabetic
ketoacidosis or other complications.
Reading food labels is a simple and easy way to know how many carbohydrates
are in a food. Be sure to pay attention the serving size, in case you would need to double
the amount of carbohydrate. Also pay close attention to the “total carbohydrate” which
includes sugar, starch, and fiber. Not all foods are labeled, therefore, it is important to be
well educated so that you can estimate how much carbohydrate is in it. Knowing general
serving sizes will help you estimate how much carbohydrate you are eating.
Exercise is encouraged for diabetics because it can improve glycemic control,
improve blood lipids and blood pressure with subsequent lower cardiovascular risks and
overall mortality, have a positive impact on metabolic abnormalities characteristic of
T2DM for individuals at high risk for developing diabetes or with pre-diabetes and help
to enhance quality of life.
Checking your blood glucose levels before and after eating is important in
determining whether you need to change your meal plan or modify it. Your physician
may need to make adjustments to your diabetes medications or insulin doses.

Sample Menu
Foods that contain carbohydrates are:
• starchy foods like bread, cereal, rice, and crackers
• fruit and juice
• milk and yogurt
• dried beans like pinto beans and soy products like veggie burgers
• Starchy vegetables like potatoes and corn
• Sweets and snack foods like sodas, juice drinks, cake, cookies, candy, and chips

*Non-starchy vegetables have a little bit of carbohydrate but in general are very low.

### Sample carbohydrate counting menu

<table>
<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>1 cup oatmeal</td>
<td>27 grams total carbohydrates = 2 carbohydrate choices</td>
</tr>
<tr>
<td></td>
<td>1 cup skim milk</td>
<td>12 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td>¾ cup blueberries</td>
<td>15 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL:</strong> 4 carbohydrate choices</td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>1 small apple</td>
<td>15 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td>6 ounces light yogurt</td>
<td>20 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td>2 slices whole wheat bread</td>
<td>30 grams total carbohydrates = 2 carbohydrate choices</td>
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<tr>
<td></td>
<td>2 ounces lean turkey and 1 slice low-fat cheese</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salad with greens, cucumbers, tomatoes, radishes, and 2 teaspoons of oil and vinegar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sugar-free gelatin and sugar-free lemonade</td>
<td><strong>TOTAL:</strong> 4 carbohydrate choices</td>
</tr>
<tr>
<td>Dinner</td>
<td>2/3 cup brown rice or whole-wheat pasta</td>
<td>30 grams total carbohydrates = 2 carbohydrate choices</td>
</tr>
<tr>
<td></td>
<td>½ cup light canned peaches with 2 tablespoons light nondairy whipped topping</td>
<td>15 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td>1 small whole wheat dinner roll</td>
<td>15 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td>4 ounces lean chicken or fish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1½ cups steamed broccoli and cauliflower</td>
<td><strong>TOTAL:</strong> 4 carbohydrate choices</td>
</tr>
<tr>
<td>Snack</td>
<td>3 cups low-fat/reduced-fat popcorn</td>
<td>15 grams total carbohydrates = 1 carbohydrate choice</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL:</strong> 1 carbohydrate choice</td>
<td></td>
</tr>
</tbody>
</table>
Sample Menu
An individual on a 2,000 kcal diet and needs 50% of their intake coming from carbohydrate would need 250 grams of carbohydrate per day.

2,000 kcals x 50% CHO / 4 kcals/g = 250 g CHO

Websites
American Diabetes Association http://www.diabetes.org/

MayoClinic.com http://www.mayoclinic.com/