

Carbohydrate Counting

Why Carbohydrates Matter¹

Carbohydrates are important since they provide energy and essential vitamins and minerals. Carbohydrates are also the primary foods that affect glucose levels. Nearly 100% of digestible starches and sugars become glucose after eating. Glucose is then released into the bloodstream to provide immediate energy needs, or stored in the muscle and liver as glycogen. Excess glucose is converted to fat for storage.

What are Carbohydrates¹?

- **Grains & starches** (rice, quinoa, oats, corn, potato, breads, cereals, some beans and legumes)
- **Fruits**
- **Milk and Yogurt**
- **Sweets and treats** (baked goods, candy, juice, soda etc.)

Proteins (like meat, poultry, fish and eggs) and fats (butter, oils, nuts etc.) have less impact on your blood glucose and are not usually considered carbohydrate counting methods. If you are concerned your blood glucose is affected by protein and fat, speak with your diabetes care team.

Fiber

Although most dietary fiber is not digestible, it contributes to digestive health by helping to keep you regular and feeling full after a meal. Fiber can be found in fruits and vegetables, whole grains and legumes.



Why Count Carbohydrates[†]?

Carbohydrate counting is a technique that allows you to dose meal time insulin based on your carbohydrate intake.

This method uses an insulin-to-carbohydrate ratio (IC ratio) that is provided to you by your healthcare provider.

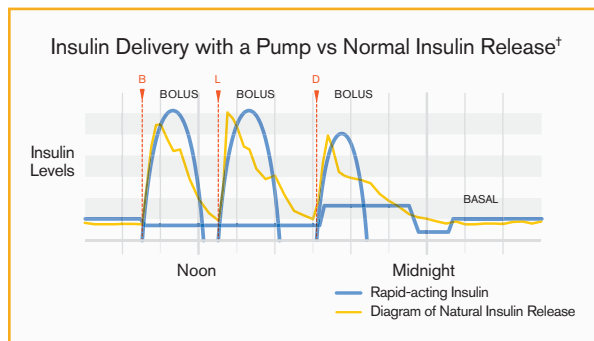
In order to understand IC ratios, it is important to understand basal insulin and bolus doses.

Basal Insulin

Your body needs a small amount of insulin constantly working in the background. If you currently take multiple daily injections (MDI), you likely use a long-acting insulin to address this. If you are using an insulin pump, you get your basal insulin from a constant infusion of rapid-acting insulin, called a **basal rate**.

Bolus Doses

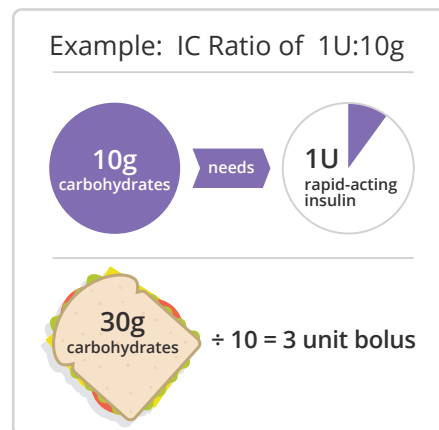
On top of basal insulin, extra insulin is needed when you plan to eat foods that are likely to raise your blood glucose (BG), like carbohydrates, and/or to correct an elevated BG value. This extra dose of insulin is called a **bolus dose**.



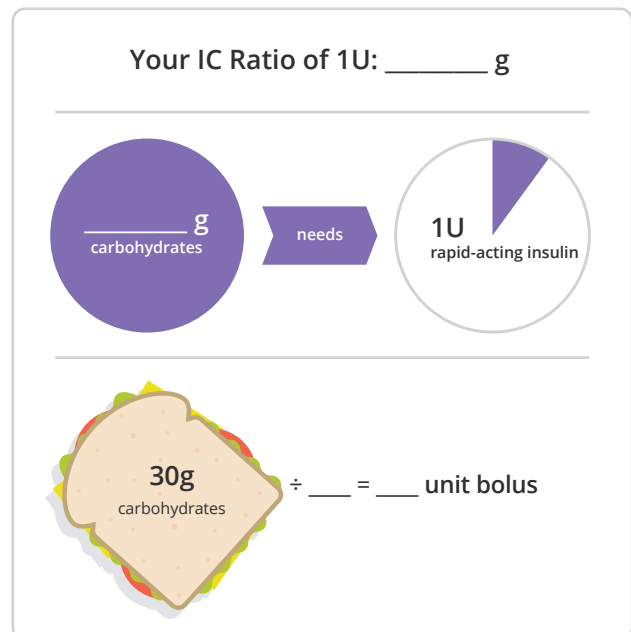
How do you use an IC Ratio?

Insulin-to-carbohydrate ratios are used to determine your meal bolus dose. This ratio helps you calculate how many units of rapid-acting insulin are needed for the amount of carbohydrates (in grams) that you plan on eating.

As you can see with this method, the amount of insulin you take for your meals is better customized to what you are going to eat. If you eat more carbohydrates, you take more insulin. If you eat fewer carbohydrates, you take less insulin.



Fill in your IC Ratio in this example



[†] Smart Pumping For People with Diabetes, A Practical Approach to Mastering the Insulin Pump, Howard Wolpert, MD, Editor. American Diabetes Association.

Sample Carbohydrate List⁴

| BREADS | | |
|-------------------------|--------------------------|--------|
| FOOD | SERVING SIZE | CARBS |
| White or wheat bread | 2 slices (2 oz) | 25-30g |
| Hotdog or hamburger bun | 1 whole (2 oz) | 25g |
| Corn bread | 1 muffin (2 oz) | 28g |
| Biscuit | 1 biscuit (2 oz) | 27g |
| Flour tortilla | 1 tortilla (8" diameter) | 25g |
| Corn tortilla | 1 tortilla (6" diameter) | 13g |
| Pita bread | 1 pita (6.5" diameter) | 33g |

| CEREALS / GRAINS / PASTA | | |
|------------------------------|--------------|-------|
| FOOD | SERVING SIZE | CARBS |
| Rice cooked (white or brown) | 2/3 cup | 30g |
| Pasta cooked | 1 cup | 38g |
| Grits cooked with water | 1 cup | 32g |
| Couscous cooked | 1 cup | 37g |
| Quinoa cooked | 1 cup | 40g |

| STARCHY VEGETABLES | | |
|----------------------------|-----------------|-------|
| FOOD | SERVING SIZE | CARBS |
| Corn | 1 cup | 35g |
| Mashed potatoes | 1 cup | 35g |
| Baked potato 3-4" diameter | 1 large (10 oz) | 64g |
| Mixed vegetables | 1 cup | 15g |

| DRIED BEANS, PEAS, LENTIL | | |
|---------------------------|--------------|-------|
| FOOD | SERVING SIZE | CARBS |
| Black beans cooked | 1/2 cup | 20g |
| Peas cooked | 1/2 cup | 12g |
| Lentils cooked | 1/2 cup | 20g |

| MILK AND MILK PRODUCTS | | |
|-------------------------------------|--------------|-------|
| FOOD | SERVING SIZE | CARBS |
| Milk (low fat, fat-free, 2%, whole) | 1 cup (8 oz) | 12g |
| Plain, low-fat, greek yogurt | 1 cup (8 oz) | 8g |

| FRUIT AND FRUIT JUICES | | |
|---|----------------|-------|
| FOOD | SERVING SIZE | CARBS |
| Apple | 1 small (4 oz) | 17g |
| Banana | 1 small (6") | 23g |
| Watermelon | 1 cup | 12g |
| Blueberries or Pineapple | 1 cup | 21g |
| Grapes | 1 cup | 27g |
| Canned fruits (in juice) | 1 cup | 28g |
| Apple, orange, grapefruit, or pineapple juice | 1/2 cup (4 oz) | 15g |

| SWEETS, DESSERTS AND SNACKS | | |
|--------------------------------------|-----------------|--------|
| FOOD | SERVING SIZE | CARBS |
| Vanilla ice cream (regular) | 1/2 cup | 15-20g |
| Chocolate chip cookie | 1 cookie (1 oz) | 20g |
| Frozen yogurt | 1/2 cup | 19g |
| Popcorn (regular, microwave) | 1 cup popped | 5g |
| Pretzels | 1 oz | 23g |
| Potato chips (plain, lightly-salted) | 1 oz (15 chips) | 15g |

Three Steps Of Carbohydrate Counting

Step 1

Identify the Carbohydrates

Foods we eat are categorized into the following:

Carbohydrates

Starches, starchy vegetables, legumes, fruit, fruit juice, dairy products (not cheese), and sweets

Proteins

Meat, fish, eggs, tofu, cheese, and nuts

Fats

Cooking oils, butter, margarine, cream, avocado, cheese, and nuts

Free foods

Non-starchy vegetables, artificial sweeteners, condiments like mustard or low-calorie dressing

For example, if you have a meal of grilled chicken, mashed potatoes, green beans, corn and a fruit cup, you would focus on just the potatoes, corn, and fruit for your carbohydrate count.



Identify the carbohydrates



Estimate the portion



Calculate the grams
30g carbs total

Step 2

Estimate the Portion²

After you have identified the carbohydrates in your meal, it's time to estimate how much you plan to eat. There are several ways you can do this:

Measuring cups

Initially, you will find it helpful to use measuring cups to gauge serving sizes. Before you know it, you will be able to "eye-ball" a portion and be fairly accurate!

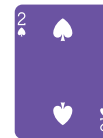
Nutritional food scales

Some find scales helpful as this is the most accurate way to determine carbohydrate grams. This method tends to be a little more complicated and not widely used.

Estimate by comparison: You may find these comparisons helpful when estimating portions.



1 teaspoon of margarine is the size of one dice



3 ounces of meat is the size of a deck of cards



1 cup of pasta is the size of a baseball



1½ ounces of cheese is the size of four stacked dice



½ cup of fresh fruit is the size of a tennis ball

Step 3

Calculate the Grams

Once you know the portion size of the carbohydrates in your meal, it's time to count the grams of carbohydrates using the nutrition label or food lists.



Nutrition Facts Label³

If you have this available on your food product, here is some advice on where to look. The two key pieces of information on the nutrition facts label for carbohydrate counting are the serving size and total carbohydrates.

Serving Size

Nutritional facts are calculated based on this portion

Total Carbohydrates

Includes grams of sugar, sugar alcohol, starch, and dietary fiber

Added Sugars

Sugars that are either added during processing or packaging

Nutrition Facts

10 servings per container

Serving size 2 slices (56g)

Amount per serving

Calories 170

% Daily Value*

Total Fat 1.5g **2%**

Saturated Fat 0.5g **3%**

Trans Fat 0.5g

Cholesterol 0 mg **0%**

Sodium 280mg **12%**

Total Carbohydrate 36g **13%**

Dietary Fiber 2g **7%**

Total Sugars 1g

Includes 1g Added Sugars **2%**

Protein 3g

Vitamin D 0mcg 0%

Calcium 80mg 6%

Iron 1mg 6%

Potassium 470mg 10%

Thiamin 15%

Riboflavin 8%

Niacin 10%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice

References

1. Beaser RS. Joslin's Diabetes Deskbook: A guide for primary care providers. 3rd ed. Boston, MA: Joslin Diabetes Center; 2014.
2. Serving Size vs. Portion Size: Is There a Difference? Academy of Nutrition and Dietetics Website. <https://www.eatright.org/food/nutrition/nutrition-facts-and-food-labels/serving-size-vs-portion-size-is-there-a-difference> Accessed February 3, 2021
3. US Food and Drug Administration Website. <https://www.fda.gov/food/nutrition-education-resources-materials/new-nutrition-facts-label> Accessed February 3, 2021
4. U.S. Department of Agriculture, Agricultural Research Service. FoodData Central, 2019. fdc.nal.usda.gov. Accessed February 3, 2021

Get Started

Keeping a food diary, especially when you are starting, may help you keep track of your glucose levels and the amount of carbohydrates you are eating.

Sample Food Diary

| Breakfast | | Date: |
|----------------|------|---------------|
| Blood Glucose | Food | Carbs (grams) |
| Pre Meal: | | |
| After Meal: | | |
| Medication(s): | | |
| Other notes: | | |

| Lunch | | Date: |
|----------------|------|---------------|
| Blood Glucose | Food | Carbs (grams) |
| Pre Meal: | | |
| After Meal: | | |
| Medication(s): | | |
| Other notes: | | |

| Dinner | | Date: |
|----------------|------|---------------|
| Blood Glucose | Food | Carbs (grams) |
| Pre Meal: | | |
| After Meal: | | |
| Medication(s): | | |
| Other notes: | | |

| Snack | | Date: |
|----------------|------|---------------|
| Blood Glucose | Food | Carbs (grams) |
| Pre Meal: | | |
| After Meal: | | |
| Medication(s): | | |
| Other notes: | | |