



PATIENT & CAREGIVER EDUCATION

How To Improve Your Blood Sugar With Your Diet

This information explains how to improve your blood sugar (glucose) with your diet. It also explains how to manage treatment side effects and control your blood sugar at the same time.

How to control your blood sugar with your diet

Many things can affect your blood sugar, such as:

- Stress.
- Medications.
- Changes to your diet.
- Physical activity and exercise.

Some cancer treatments and their side effects can also make your blood sugar levels go up or down. Managing your blood sugar is an important part of your cancer care, and we're here to help.

A big part of controlling your blood sugar is

understanding what to eat. This can feel overwhelming. You might hear different kinds of advice. The best diet for any individual is personal. Your ideal diet is based on your health, treatment plan, and personal preferences. It is different for everyone.

That's why the American Diabetes Association has general guidelines. They can help you control your blood sugar, stay at a healthy weight, and lower your risk for heart disease. It's also important to try to follow a well-balanced diet that gives you the nutrients your body needs.

To learn more, talk with a clinical dietitian nutritionist. They will base their recommendations on your health and health goals.

About carbohydrates

There are 3 main types of nutrients:

- Carbohydrates, also called carbs.
- Fats.
- Proteins.

These main nutrients are sometimes called macronutrients or macros. While each one has a different purpose, they work together to give you

energy. Many foods have all three of these nutrients.

Before food can give you energy, your body needs to break it down into a sugar called glucose. While all nutrients can be turned into glucose, the process is much easier with carbohydrates. That's why your body prefers to use carbohydrates as its main source of energy.

How carbohydrates affect your blood sugar

While carbohydrates give your body energy, they also affect your blood sugar levels. If you eat too many carbohydrates, you may have a higher risk for blood sugar problems.

Not all carbohydrates raise your blood sugar the same way. Some raise your blood sugar levels very quickly, while others raise them more slowly (see Figure 1). This can make it hard to control your blood sugar. It's important to keep your blood sugar from getting too high (hyperglycemia) or too low (hypoglycemia).

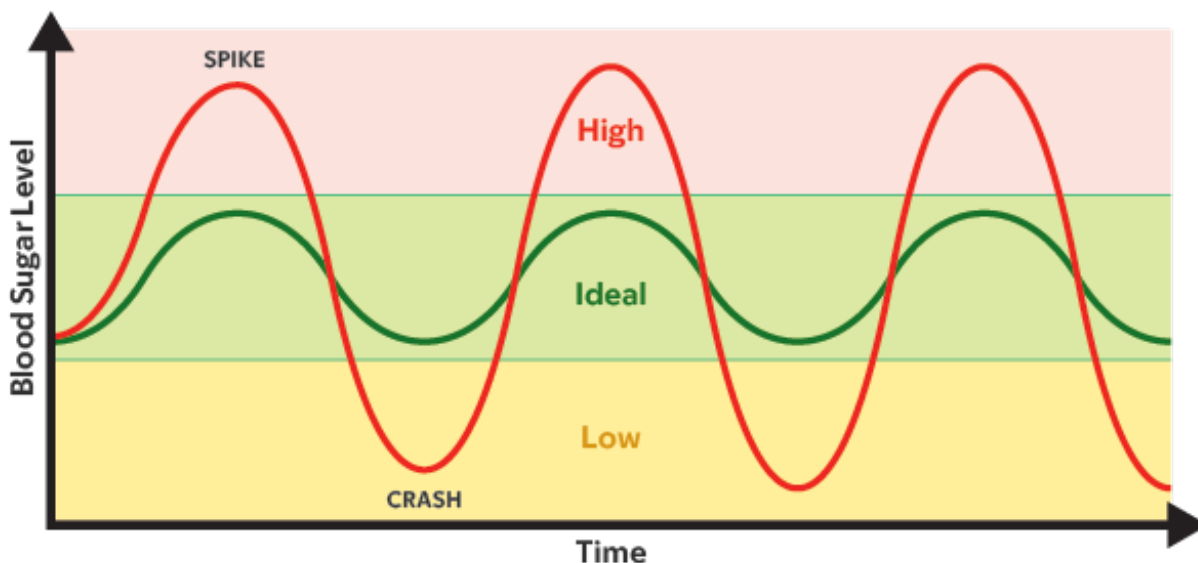


Figure 1. How your blood sugar level goes up and down

Your healthcare provider or diabetes educator will set your blood sugar target numbers. Keeping your blood sugar near those target numbers is an important part of your treatment.

For people taking diabetes medication

If you take diabetes medication, talk with your healthcare provider or diabetes educator before lowering the amount of carbohydrates you eat. If you lower the amount of carbohydrates you eat by too much, you could be at risk for low blood sugar (hypoglycemia). To learn more, read *About Hypoglycemia (Low Blood Sugar)* (www.mskcc.org/pe/low_blood_sugar).

How to choose your carbs wisely

Since carbohydrates are a good source of energy and nutrition, it's important to include some in your diet. During your treatment, you may be asked to keep track of or change the amount of carbohydrates you eat. This is to help control your blood sugar levels.

This section gives general tips on how to control your blood sugar through your diet. To learn more, talk with your clinical dietitian nutritionist or diabetes educator.

Choose foods with the right amount of carbohydrates

The following table has examples of foods with carbohydrates. It includes foods with fewer carbohydrates that still have the nutrition you need.

When you're managing your blood sugar, you may need to eat less carbohydrates. Choose foods with fewer carbohydrates when your blood sugar is high.

| Foods with carbohydrates | Foods without carbohydrates |
|---|---|
| <ul style="list-style-type: none">• Milk, yogurt, ice cream• Whole fresh fruit, dried fruit, juice• Bread, cereal, rice, pasta• Beans, lentils | <ul style="list-style-type: none">• Meat and poultry, such as beef, pork, veal, lamb, chicken, turkey• Fish and seafood• Cheese |

- Starchy vegetables, such as potato, corn, peas, butternut squash
- Soda, sweetened iced tea, fruit punch
- Cake, candy, chocolate, cookies, crackers, chips, popcorn, pretzels

- Eggs
- Butter and oil
- Non starchy vegetables, such as tomato, pepper, spinach, kale, broccoli, cauliflower

How to control your blood sugar with fiber

Another way to control your blood sugar is to choose carbohydrates that have more fiber and less sugar. Fiber helps control blood sugar levels by slowing down the absorption of sugar into your body. Choose foods with more than 3 grams (g) of fiber per serving.

You can find the amount of fiber in packaged foods by reading the Nutrition Facts label. The Nutrition Facts label has information about the amount of certain nutrients in the food or drink. The amount of fiber is listed in the “Dietary Fiber” row (see Figure 2).

| Nutrition Facts | |
|-------------------------------|----------------------|
| 8 servings per container | |
| Serving size | 2/3 cup (55g) |
| Amount per serving | |
| Calories | 230 |
| % Daily Value* | |
| Total Fat 8g | 10% |
| Saturated Fat 1g | 5% |
| <i>Trans Fat</i> 0g | |
| Cholesterol 0mg | 0% |
| Sodium 160mg | 7% |
| Total Carbohydrate 37g | 13% |
| Dietary Fiber 4g | 14% |
| Total Sugars 12g | |
| Includes 10g Added Sugars | 20% |
| Protein 3g | |
| Vitamin D 2mcg | 10% |
| Calcium 260mg | 20% |
| Iron 8mg | 45% |
| Potassium 235mg | 6% |

| Nutrition Facts | |
|-------------------------------|----------------------|
| 8 servings per container | |
| Serving size | 2/3 cup (60g) |
| Amount per serving | |
| Calories | 110 |
| % Daily Value* | |
| Total Fat 3g | 4% |
| Saturated Fat 0.5g | 3% |
| <i>Trans Fat</i> 0g | |
| Cholesterol 0mg | 0% |
| Sodium 65mg | 3% |
| Total Carbohydrate 18g | 7% |
| Dietary Fiber 2g | 7% |
| Total Sugars 3g | |
| Includes 3g Added Sugars | 6% |
| Protein 5g | 8% |
| Vitamin D 0mcg | 0% |
| Calcium 26mg | 2% |
| Iron 1mg | 6% |
| Potassium 82mg | 2% |

Figure 2. Where to find dietary fiber on a Nutrition Facts label

Soluble fiber

Soluble fiber helps control blood sugar levels by slowing down how fast your body uses carbohydrates. It breaks down in water to form a gel and is easier for your body to digest. Soluble fiber is found in foods such as oats, peas, beans, apples, citrus foods, and barley.

It's important to eat high-fiber foods that have soluble fiber, such as:

- $\frac{3}{4}$ cup to 1 cup serving of multi-grain cereal.
- $\frac{1}{2}$ cup of cooked beans or lentils.
- 3 cups of air popped popcorn.
- 1 medium potato, regular or sweet potato.

It can be hard to only eat carbohydrates that are high in fiber. Try to switch out low-fiber foods with high-fiber foods as often as you can.

Limit the amount of carbohydrates in your meals, when needed

If your blood sugar is high, having meals with fewer carbohydrates can help bring it back to your target range. Never stop eating all carbohydrates, especially if you take insulin. This can make your blood sugar go too low. Talk with your healthcare provider for more information.

Here are some ways to have less carbohydrates in your meals:

- Have 1 main source of carbohydrate in your meal instead of 2. For example, have either whole grain rice or beans instead of both.
- Add spices such as cinnamon or ginger to cereals instead of fruit.
- Drink sugar-free, flavored water and sparkling water

instead of fruit juice. Fruit juice made with real fruit usually has a lot of sugar.

- Add vegetables and proteins to carbohydrate-rich meals. For example, have a salad and chicken with your pasta instead of just pasta.
- Substitute or add more protein, such as an egg, to your breakfast instead of having more bread or fruit.

How to count carbohydrates to control your blood sugar

Carbohydrate counting is when you plan and track meals that have a certain number of grams of carbohydrates per meal. Carbohydrate counting helps you control your blood sugar levels with the food you eat. This type of meal plan is commonly recommended for people taking insulin.

When you're carbohydrate counting, use the number in the "Total Carbohydrate" row in the Nutrition Facts label (see Figure 2). Aim for 45 to 50 grams total carbohydrate at each meal, or the amount of carbohydrates your care team recommends.

Steps to carbohydrate counting

Step 1: Talk with your care team to decide the amount of carbohydrates you should have at each meal.

Step 2: Learn to choose the foods and food groups that add the right amount of carbohydrates to your diet. Talk with a clinical dietitian nutritionist or diabetes educator for more information.

Step 3: Calculate the grams of carbohydrates (per serving) for the food you're eating. Use the Nutrition Facts label listed on the food package to do this.

Step 4: Measure your foods to the serving size on the food label (see Figure 3). You can use a measuring cup or a kitchen scale. It's important to measure your food initially so that you get used to what the serving size is. But after you become used to what the serving size looks like, it's OK to estimate your measurements. They don't need to be exact. Talk with your clinical dietitian nutritionist for more information about measuring your serving sizes.

Carbohydrate counting example

Use the Nutrition Facts labels to practice calculating the amount of carbohydrates in a meal. Calculate the

amount of carbohydrates for 1 serving of Cheerios™ and 1 serving of milk (see Figures 3 and 4).

| Nutrition Facts | |
|-------------------------------|----------------------|
| Serving Size | 1 ½ cup (39g) |
| Amount per serving | |
| Calories | 140 |
| % Daily Value * | |
| Total Fat 2.5g | 3% |
| Saturated Fat 0.5g | 3% |
| Trans Fat 0g | |
| Polyunsaturated Fat 1g | |
| Monounsaturated Fat 1g | |
| Cholesterol 0mg | 0% |
| Sodium 190mg | 8% |
| Potassium 250mg | 6% |
| Total Carbohydrate 29g | 11% |
| Dietary Fiber 4g | 14% |
| Soluble Fiber 2g | |
| Total Sugars 2g | |
| Incl. 1g Added Sugars | 2% |
| Protein 5g | |
| Vitamin D 2mcg | 10% |
| Calcium 130mg | 10% |
| Iron 12.6mg | 70% |

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

Figure 3.
Nutrition Facts
label for Cheerios

| Nutrition Facts | |
|--|------------------------|
| Serving Size | 1 cup (240mL) |
| Amount per serving | 100 |
| Calories | |
| | % Daily Value * |
| Total Fat 2.5g | 4% |
| Saturated Fat 1.5g | 8% |
| Trans Fat 0g | |
| Polyunsaturated Fat 0g | |
| Monounsaturated Fat 0.5g | |
| Cholesterol 10mg | 3% |
| Sodium 105mg | 4% |
| Potassium 370mg | 11% |
| Total Carbohydrate 12g | 4% |
| Dietary Fiber 0g | 0% |
| Sugars 12g | |
| Protein 8g | |
| Vitamin A 10% • Vitamin C 0% • Calcium 30% | |
| Iron 0% • Vitamin D 30% • Folic Acid 0% | |
| *The % Daily Value (DV) tells you how much a nutrient in a serving contributes to a daily diet. 2,000 calories a day is used for general nutrition advice. | |

Figure 4.
Nutrition Facts
label for 1% low
fat milk

Total carbohydrates in Cheerios: **29 g**

Total carbohydrates in 1% low fat milk: **12 g**

$29\text{ g} + 12\text{ g} = \mathbf{41\text{ g}}$

Your breakfast of Cheerios and 1% low fat milk has a total of 41 g of carbohydrates. This is for a serving size of 1 ½ cups (32 g) of Cheerios and 1 cup of 1% milk. Remember to measure this amount of Cheerios and milk when serving yourself a bowl.

Difference between grams listed on Nutrition Facts labels

Sometimes both the serving size and the amount of carbohydrates in a serving can be measured in grams.

But they are not the same.

- Grams (g) listed next to the **“Serving Size”** tells you the weight of the food item in grams. If you are using a food scale, you can use this information to measure the serving size (see Figure 5).
- Grams (g) listed next to **“Total Carbohydrate”** tells you the amount of carbohydrate in one serving of the food (see Figure 5).

| Nutrition Facts | |
|-------------------------------|------------------------|
| Serving Size | 1 ½ cup (39g) |
| Amount per serving | |
| Calories | 140 |
| | % Daily Value * |
| Total Fat 2.5g | 3% |
| Saturated Fat 0.5g | 3% |
| Trans Fat 0g | |
| Polyunsaturated Fat 1g | |
| Monounsaturated Fat 1g | |
| Cholesterol 0mg | 0% |
| Sodium 190mg | 8% |
| Potassium 250mg | 6% |
| Total Carbohydrate 29g | 11% |
| Dietary Fiber 4g | 14% |
| Soluble Fiber 2g | |
| Total Sugars 2g | |
| Incl. 1g Added Sugars | 2% |
| Protein 5g | |
| Vitamin D 2mcg | 10% |
| Calcium 130mg | 10% |
| Iron 12.6mg | 70% |

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

Figure 5. Grams listed on Nutrition Facts label

What to do when you do not have a Nutrition Facts label

If a food does not have a Nutrition Facts label or you're eating out, look up the carbohydrate information online. Some websites, such as www.CalorieKing.com and www.MyFitnessPal.com, also have mobile applications (apps) for your smartphone or tablet. Talk with a clinical dietitian nutritionist for more resources.

For people taking insulin

If you're taking insulin, your healthcare provider can show you how to measure your insulin dose for each meal. Talk with your healthcare provider or diabetes educator for more information.

How to manage nutrition during cancer treatment

During cancer treatment, side effects can limit your ability to eat well. Side effects can include nausea (feeling like you're going to throw up), taste changes, or appetite loss (not wanting to eat).

Being unable to eat can raise your risk for weight loss. It also raises your risk for malnutrition (when your body does not get all the nutrients it needs).

Read *Eating Well During Your Cancer Treatment* (www.mskcc.org/pe/eating_cancer_treatment) to learn more about general nutrition guidelines during cancer care.

If you're having a hard time eating during treatment, talk with your healthcare providers and clinical dietitian nutritionist. You may need to change your diet to get the nutrients you need. Sometimes, they may want you to

focus less on carbohydrate counting.

Eating small meals more often can make it easier to meet your nutrition goals. Your clinical dietitian nutritionist can help set your carbohydrate goals for each smaller meal. Focus on eating more protein and healthy fats. This will help you get the nutrients you need while controlling your blood sugar.

Here are some examples of foods with proteins and healthy fats:

- Nuts and nut butters.
- Seeds, such as pumpkin seeds or flax seeds.
- Avocados.
- Unsweetened (plain) yogurt and cheese.
- Lean protein, such as fish, chicken, eggs, and tofu.
- Olive oil and canola oil.

Diet changes can help. But you still may need medication to manage side effects better. If you're prescribed medications, be sure to follow your care team's instructions for taking them.

Tips for managing side effects of treatment and high blood sugar

Here are some tips on what you can eat to manage side effects of treatment while controlling your blood sugar.

How to manage nausea during your treatment

Nausea is often caused by radiation therapy, chemotherapy, and surgery. It can also be caused by pain, medication, and infection. To manage nausea, try to:

- Eat starchy, bland foods, such as dry toast or crackers.
- Eat plain or vanilla yogurt.
- Eat ice chips.
- Have a low-sugar carbonated (fizzy) drink.
- Avoid foods that have a strong smell.
- Drink ginger tea.

For more tips, read *Managing Nausea and Vomiting* (www.mskcc.org/pe/nausea_vomiting) or talk with a clinical dietitian nutritionist or diabetes educator.

How to manage taste changes during your treatment

Treatment can affect your sense of taste. Taste changes are different from person to person. The most common changes are having bitter and metallic tastes in your mouth. Sometimes, food may not taste like anything. These changes may make you want to eat more carbohydrates.

Before making a meal with a larger carbohydrate portion, try:

- Using fresh and strong herbs and spices.
- Choosing and making foods that look and smell good to you.
- Eating sour and tart foods. They can help stimulate your taste. You can also squeeze some lemon on your food.
- Adding water or salt to foods that are too sweet.
- Eating with plastic or wooden utensils instead of metal ones if food has a metallic taste.

For more tips, read *Managing Taste Changes During Chemotherapy*

(www.mskcc.org/pe/taste_changes_chemo) or talk with a clinical dietitian nutritionist.

How to manage loss of appetite during your treatment

Appetite loss means you have less of a desire to eat. It's a very common side effect of treatment. When you lose your appetite, you may want to eat comfort foods to feel better. This can make it harder to eat a well-balanced diet and control blood sugar levels.

Try these tips to help you get the most from your meals when you can't eat much:

- Add more protein to your diet, such as chicken, fish, eggs, or tofu.
- Have a protein shake or nutritional supplement that's high in protein and low in carbohydrates. Some are high-calorie, ready-made drinks that have vitamins and minerals added to them. Others are powders that you can mix into other foods or drinks. Most are also lactose-free. That means you can have them even if you're lactose intolerant (have trouble digesting milk products). Talk with a clinical dietitian nutritionist for suggestions.
- Talk with your healthcare provider about your symptoms. They may give you a prescription for a medication to help with your appetite.

It's hard to manage your blood sugar while going

through cancer treatment. Sometimes you need more than the right diet and exercise routine. If you're having trouble controlling your blood sugar, talk with your care team.

If you have questions or concerns, contact your healthcare provider. A member of your care team will answer Monday through Friday from 9 a.m. to 5 p.m. Outside those hours, you can leave a message or talk with another MSK provider. There is always a doctor or nurse on call. If you're not sure how to reach your healthcare provider, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

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