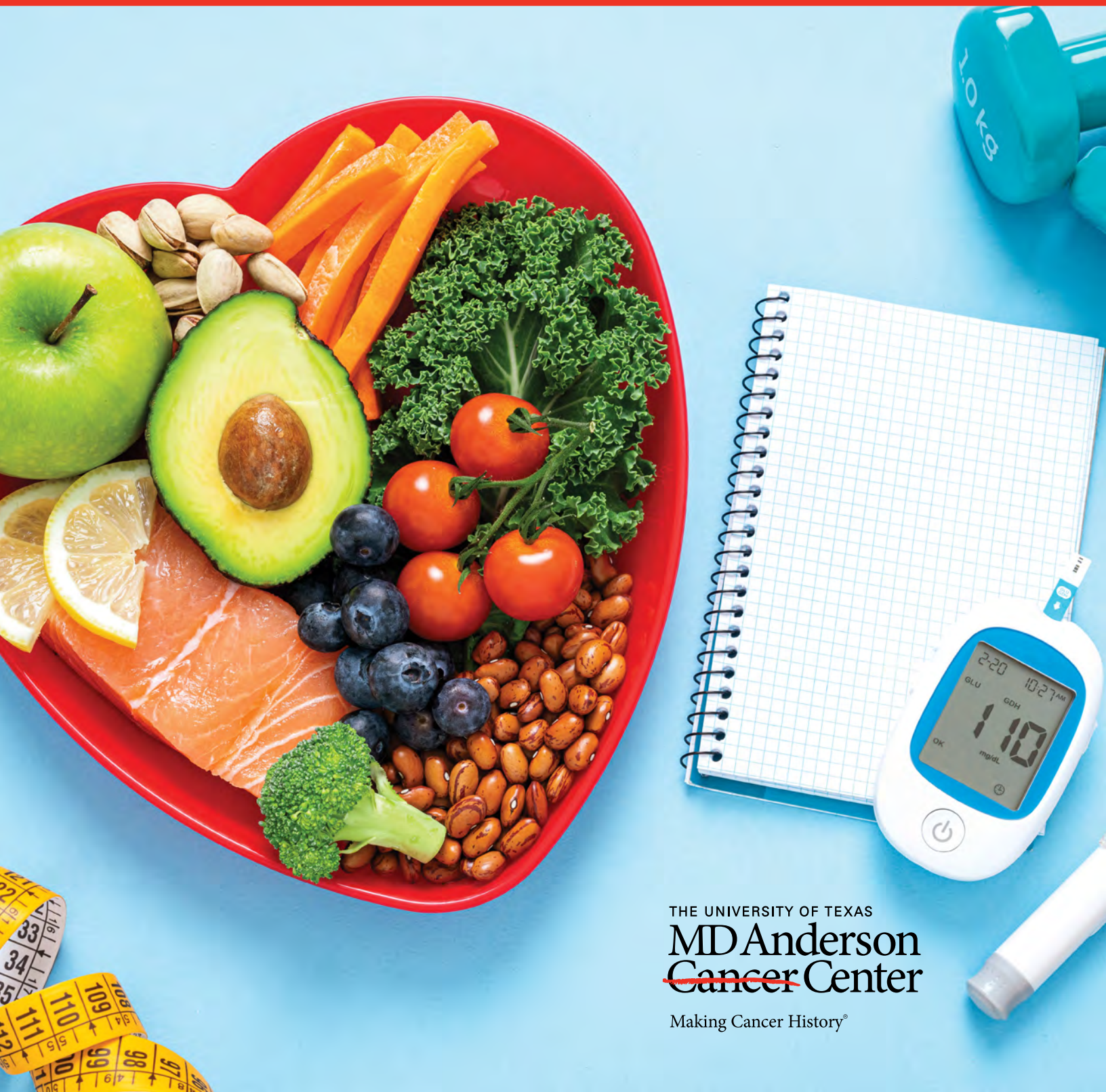
Diabetes Management During Cancer Treatment



THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Making Cancer History®

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Diabetes and Cancer Treatment

Up to 50% of cancer patients already have diabetes or develop diabetes during cancer treatment. Diabetes is a chronic condition that impacts the ability to regulate blood sugar levels. It is important for patients to balance diabetes management while receiving cancer treatment. Managing your blood sugar levels can help your overall health. Good blood sugar control allows you to have needed surgery or clinical trial treatment.

Radiation therapy, steroids, immunotherapy and some types of chemotherapy may impact your blood sugar levels. Uncontrolled high blood sugar can lead to dehydration, which can increase the amount of chemotherapy or other treatment medicines in the body to toxic levels. This can increase your chances of an infection and poor wound healing. Also, uncontrolled blood sugar levels can have a negative impact on your other organs. Maintaining your doctor's recommended blood sugar levels can keep you strong during cancer treatment.

Remember, if you have diabetes, the best thing you can do is to make sure your blood sugar levels are under control. That's true before, during and after cancer treatment.

The outpatient Endocrine-Diabetes team is available to provide consultations to cancer patients with diabetes as they undergo cancer treatment. During admission to the hospital, certain patients with diabetes may be referred to an inpatient endocrinology team for specialty care.

Learn more about diabetes management and cancer at MDAnderson.org/DiabetesManagement.

Diabetes

Glucose (sugar) is an important source of energy for our bodies. Sugar that is found in the blood comes from the food we eat, and from our liver, where excess sugar is stored. The pancreas makes a hormone called insulin which helps sugar in the blood move into the cells to use for energy.

A person with diabetes may either produce too little insulin or not be able to use the body's insulin well to move sugar from the bloodstream into the cells. As a result, blood sugar levels can rise, leaving the body in need of energy.

Types of Diabetes

Type 1 Diabetes

Type 1 diabetes is a condition where the pancreas stops producing insulin. People of all ages, including older adults, can develop type 1 diabetes.

Without insulin, blood sugar levels in the body get too high. As a result, the body tries to flush sugar out by frequent urination. This leads to excessive thirst and may result in drinking lots of water. People with untreated type 1 diabetes often lose weight despite being hungry. Patients with type 1 diabetes need lifelong insulin therapy, which is usually given by injection with a pen or pump. A severe episode of hyperglycemia or high blood sugar may lead to diabetic ketoacidosis (DKA), a potentially life-threatening complication requiring hospitalization.

If you have type 1 diabetes and start cancer treatment, you may need to make changes to your insulin dose. Steroids are often used to treat side effects of cancer treatment. Taking steroids can raise blood sugar levels, which can be life-threatening if severe. Cancer and its treatment can also affect your appetite and activity level, which may impact your blood sugar control. If you use an insulin pump, you may need to adjust its settings to reflect these changes. It's important to talk to your diabetes care team before surgery, as you may also need to modify insulin doses or device settings.

Type 2 Diabetes

People with type 2 diabetes produce insulin, but their bodies do not use it well, leading to poor blood sugar control. Although some people with type 2 diabetes also experience increased thirst, urination and hunger, most people have no symptoms at all.

Type 2 diabetes may go undiagnosed for years. Type 2 diabetes is much more common than type 1 diabetes. Over 90% of patients with diabetes have type 2. Type 2 diabetes is more frequent with increasing age but is becoming more common in overweight children and adolescents. Diet and various medicines often can control type 2 diabetes. Patients may or may not need insulin therapy.

If you have type 2 diabetes and start cancer treatment, you may need to change your diabetes medicines. Some patients with diabetes lose weight during cancer treatment. Your doctor may reduce the number of diabetes medicines you take or decrease the dosages.

Taking steroids during cancer treatment, along with a decreased in physical activity, can result in high blood sugar levels. Your doctor may increase your oral diabetes medicines or insulin to control your blood sugar levels.

Your diabetes treatment plan may vary depending on when you are on chemotherapy or when you are in between treatment cycles. It is important to keep your follow-up appointments with your doctor to make sure your blood sugar is controlled during cancer treatment.

Talk with your care team if you lose weight during cancer treatment. Your doctor may adjust your diabetes medicine or insulin dosage.

Secondary Diabetes

Secondary diabetes occurs because of other diseases or treatments. Some cancer patients may not be aware they have diabetes until it is confirmed with blood tests. It may or may not go away over time. Patients may have classic symptoms like feeling thirsty or urinating often. Potential causes include:

- Cancer treatments, such as steroids and some chemotherapy medicines.
- Disorders of the pancreas, such as pancreatic cancer or pancreatitis.
- Use of tube feeding, a way to get artificial nutrition through a tube that is placed into your stomach or intestine. Depending on your medical needs, this tube goes through the nose or through the skin in your abdomen.
- Parenteral nutrition therapy (TPN) or feeding by IV. The IV tube is connected to a bag of liquid formula which goes from the bag through the tube and into a vein.
- Cushing's syndrome and other hormonal disorders.
- A pancreatectomy which is surgery to remove all or part of the pancreas.

Medicine

Your doctor may prescribe pills or injections to keep your blood sugar under control. You may need this for a short time or life time depending on your blood test results.

Steroids

Steroids cause blood sugar levels to be higher than usual. This occurs for many reasons. One reason is that steroids cause your liver to release sugar into your bloodstream. This causes your blood sugar level to rise. Too much blood sugar in the blood is called hyperglycemia. Another reason is that steroids weaken the effect of insulin. Insulin works to lower your blood sugar. As a result, steroids cause your blood sugar level to rise.

The effect that steroids have on blood sugar level is related to the strength or dose of the steroid you are taking. Most often, higher doses of steroids cause higher blood sugar levels. This causes you to need more insulin to control blood sugar level. Diabetes pills may help, but very often, insulin is needed while steroids are being used.

Insulin

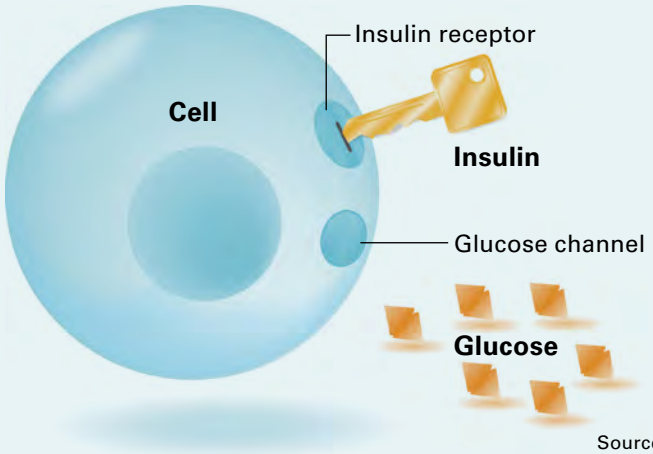
Insulin is a hormone that is made by your pancreas. Insulin works by helping digested blood sugar move from the bloodstream into the cells of the body, where the sugar is used for growth and energy.

When blood sugar is higher than normal, it is because either the pancreas does not make enough insulin for your body, or it does not use insulin the way it should. Insulin may be given to bring the blood sugar level down quickly.

You may need insulin for a few months, or you may need it long term depending on other factors. Steroids and other medicines can cause high blood sugar levels that require treatment with insulin to lower your blood sugar levels to the goal needed for the best treatment. Discuss your goal for blood sugar levels with your care team.

Importance of Insulin

Insulin acts as the key which unlocks the cell to allow glucose to enter the cell and be used for energy.



Source: Getty Images

Self-Monitoring Blood Sugar Levels

Blood Sugar Testing at Home

Checking your blood sugar regularly is important to managing diabetes. Your care team will let you how often to check your blood sugar levels. Keeping a log of your blood sugar readings, medicine doses, food intake and activities can help both you and your care team make changes. Maintaining good blood sugar control lowers the risks of complications. Follow these steps to check your blood sugar.

1 Gather the supplies needed:

- Blood glucose meter (glucometer)
  - A hand-held unit that is reusable.
  - Purchase at a pharmacy or sometimes provided for free if available at your diabetes clinic.
- Alcohol prep pads
  - Use to wipe finger before the finger stick.
- Finger stick device or lancing device with matching lancets
  - Make sure to use a new lancet for every new finger stick.
  - Most lancing devices have an adjustable setting to set how deep the needle will go. Find the setting that works best for you to get an adequate blood sample.
- Test strips. These are flat strips with a reagent on the end.
  - The test strip brand must match the brand of the glucose meter.

2 Wash your hands with soap and water.

3 Open the lancing device.

4 Place a new lancet in the lancing device.

5 Recap the lancing device and adjust the depth if needed. Look for numbers on the lancing device. Larger numbers are for deeper puncture.

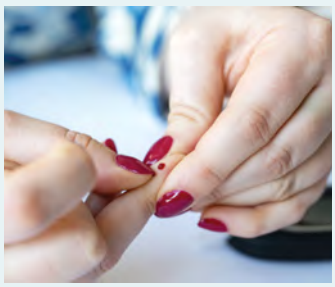
6 Insert a new test strip into the port of the glucose meter with the barcode facing up.

7 Make sure you see the flashing blood drop on the screen. This means it is ready to take a blood sample.

8 Choose a finger to obtain blood. The side of the fingers may hurt less than the tips. Make sure to rotate to a different finger each time you take blood. Wipe your finger with an alcohol pad and make sure to let it dry completely before doing a finger stick.

9 Prepare lancing device by pulling back on bottom lever and let go.

10 Place tip of lancing device against your finger. Next, press the button to release the needle.



11 Squeeze your finger to get a drop of blood out. If no blood comes out, or a very small amount, you may need to increase the depth on the lancing device.

12 Once you have a drop of blood on your finger, take the glucometer with the strip in it and touch the bottom end of the strip to the drop of blood. Hold it there until the blood fills the entire line and you hear a beep.

13 The results will appear on the screen of the meter after a few seconds.

14 Record your blood sugar in the blood sugar log sheet.

15 Open the lancing device and pull out the used lancet.

16 Throw it away in a sharps container. The used strip can be disposed of in a trash can. Once your sharps container is full, seal the cap with tape. Properly dispose of the container.

Control Solution

The control solution included with your testing kit is for use with your glucose meter and test strips. It is used to check that the meter and test strips are working together properly. Use control solution instead of blood to make sure the system is working the way it should.

Instructions

1. Check expiration date on control solution bottle and test strip container. **Do not** use if they have expired.
2. Allow test strips, meter and control solution to sit at room temperature for 10 minutes.
3. With cap on, gently swirl or invert control solution bottle several times. **Do not** shake bottle.
4. Remove test strip from vial and recap container right away.
5. Insert test strip into meter and wait for it to turn on.
6. Remove cap from control solution. Squeeze one drop of control solution onto a clean tissue. Wipe tip of bottle with clean tissue.
7. Squeeze another drop of control solution onto a new piece of aluminum foil or clear plastic wrap. With the test strip in the meter, touch tip of test strip to the drop of control solution. Wait for solution to be drawn into the test strip. When meter begins testing, remove test strip from drop of solution.
8. Compare result from meter to the control test range labeled on the test strip container. Contact your care team or pharmacy if the control result is not within the printed range.
9. Remove test strip from meter and throw it away in a trash can.
10. Wipe tip of control solution with a clean tissue and recap the bottle.

Continuous Glucose Monitor

A continuous glucose monitor (CGM) estimates your glucose level every few minutes and keeps track of it over time. This gives you real time updates through a device that is attached to your body. These are typically approved for patients living with type 1 and type 2 diabetes taking insulin. There are many CGM manufacturers. Check with your insurance company and pharmacy for availability. For more information about CGMs, talk to your care team.

When to Check Your Blood Sugar

Follow your health care team's instructions on when to check your blood sugar. Recommended times to check your blood sugar:

- Before breakfast
- Before lunch
- Before dinner
- At bedtime
- 2 hours after a meal

People taking insulin injections or using an insulin pump will test several times a day. Those taking pills for type 2 diabetes usually check less often.

Extra Blood Sugar Checks

There may be times when you need to test your blood sugar in addition to the regular checks.

These may include:

- If you feel unwell. Your sugar may be too high or low. The only way to tell is to measure it.
- When you change your dose or type of diabetes medicines.
- At times of increased stress, illness or surgery.
- If you begin new medicines, such as steroids, which can raise the blood sugar.

Storage and Disposal of Supplies

Be sure to store your testing supplies in a cool dry place.

- Keep the test strip container cap on tightly.
- Check the expiration date on your test strips.
- Throw away any outdated test strips.
- Lancets can only be used one time. Throw away used lancets in a sharps container.
- A thick plastic container with a screw top works well as a safety container. A used laundry detergent bottle is an example. When the container is nearly full, seal it with tape and properly dispose of it.
- Check with your local pharmacy or clinic, as some places will collect used sharps and dispose of them for you.

Record Keeping

Keeping an accurate record helps you and your care team manage your diabetes. Most glucose meters store blood sugar results. Bring your glucose monitor with you to your appointment. Your care team may also ask you to write down your readings. Make sure to bring them with you.

General Blood Sugar Goals

- Fasting (before meals): 80 to 130 mg/dL
- 2 Hours After Meals: less than 180 mg/dL

Your Personal Goals

Fasting (before meals): _____

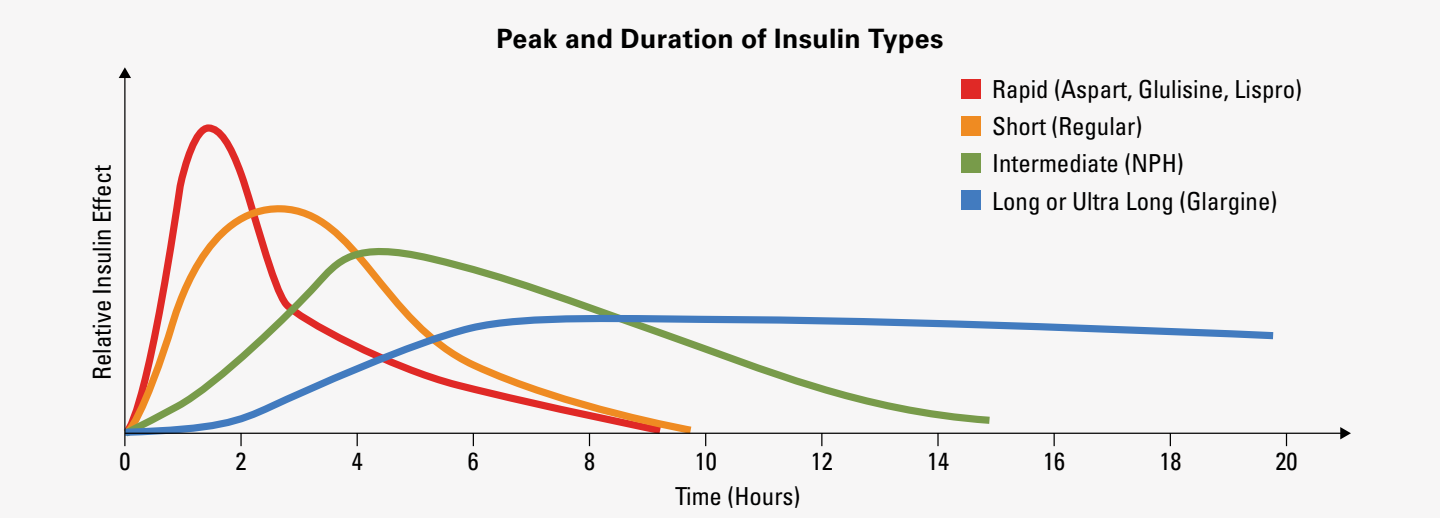
2 Hours After Meals: _____

Types of Insulin

Response time to **insulin onset**, **peak** and **duration** may vary for each person due to many factors.

Insulin and Action						
Classification	**Generic Name**	**Brand Name**	**Onset**	**Peak**	**Duration**	**Color**
Rapid-Acting	Aspart Glulisine Lispro Aspart-niacinamide Lispro-aabc Inhaled Insulin	Novolog® Merilog™ Apidra® Humalog® Admelog® Fiasp® Lyumjev® Afrezza®	5 to 15 minutes 12 to 15 minutes	1 to 2 hours 1 hour	4 to 6 hours 3 hours	Clear N/A
Short-Acting	Regular, human	Humulin® R Novolin® R Relion®/Novolin® R	30 to 60 minutes	2 to 4 hours	6 to 10 hours	Clear
Intermediate-Acting	Isophane human 70%/regular insulin 30%	Humlin® 70/30 Novolin® 70/30 Relion®/Novolin® N	30 minutes	2 to 12 hours	18 to 24 hours	Cloudy
Mixed Insulin	70% Insulin Isophane/30% Insulin regular 70% Insulin Aspart Protamine/30% Insulin Aspart 75% Insulin Lispro Protamine/ 25% Insulin Lispro	Humulin® 70/30 Novolin® 70/30 Novolog® 70/30 Humalog® 75/25	Humulin®/ Novolin® 70/30: 30 minutes to 60 minutes Novolog® 70/30: 5 to 15 minutes Humalog® 75/25: 5 to 15 minutes	Humulin®/ Novolin® 70/30: Dual peaks Novolog® 70/30: Dual peaks Humalog® 75/25: Dual peaks	Humulin® and Novolin® 70/30: 10 to 16 hours Novolog® 70/30: 24 hours Humalog® 75/25: 24 hours	Cloudy
Long-Acting	Glargine Glargine Glargine	Semglee® Lantus® Basaglar®	1 to 2 hours	No Peak	Up to 24 hours	Clear
Ultra-Long Acting	Glargine Degludec	Toujeo® Tresiba®	6 hours	No Peak	36 hours	Clear

References: Sisson, E., Kim, C & Smith, S. (2019). AADE quick guide to medications.
American Association of Diabetes Educators (2016). Diabetes Education Curriculum-A Guide to Successful Self-Management.



Storage of Insulin

Unopened, unused insulin vials and pens should be kept refrigerated 36°F to 46°F (2°C to 8°C) and protected from light. Refrigerated, unopened insulin vials and pens may be used until the expiration date. Make sure to refer to your insulin package insert for details on how long it can be kept at room temperature, as insulin will not be effective if left out longer than the suggested time.

It's a good idea to write on the insulin the date it was opened. You can also track the time when it was taken out of the fridge and how long it has been at room temperature. Never freeze insulin. If insulin has been frozen, throw it away and **do not** use.

Traveling with Insulin

Store insulin vials and pens that are open and being used at room temperature not to exceed 86°F (30°C).

Insulin Injection

Insulin lowers the amount of sugar in the blood. People with diabetes often need to take insulin injections. Your doctor will decide the right type of insulin for you, how much to give and instructions on when to give it.

Insulin Injection Sites

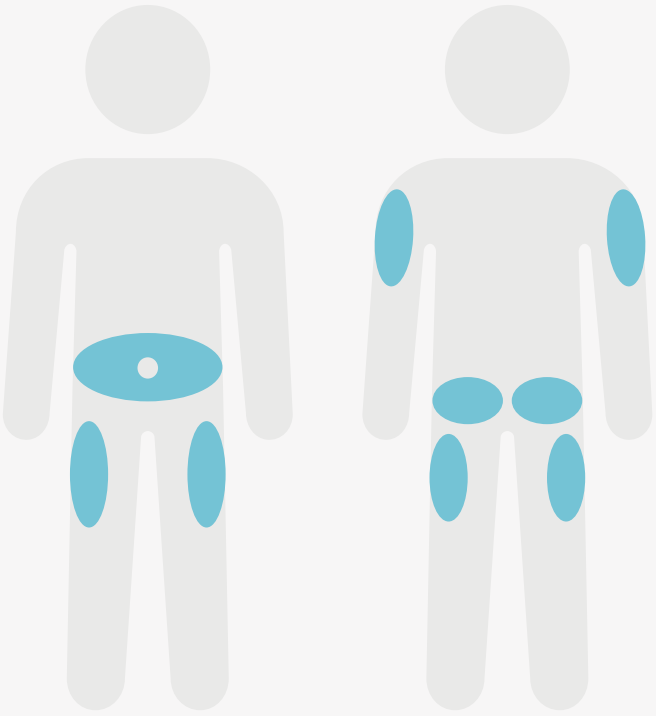
Inject insulin into the subcutaneous fat in the abdomen, outer thigh, upper buttocks and back of upper arm.

- Use a different location each day.
- Using different sites prevents scar tissue.

Gather Supplies

- Insulin pen or vial
- Insulin pen needle or syringe
- Alcohol pad or bottle of alcohol and cotton balls
- Band-Aid® (optional)
- Sharps container to throw away pen needles or syringes. Never reuse or share insulin pen needles or syringes. Always throw away after each use.

Insulin Injection Sites



Injection Using Insulin Vial and Syringe

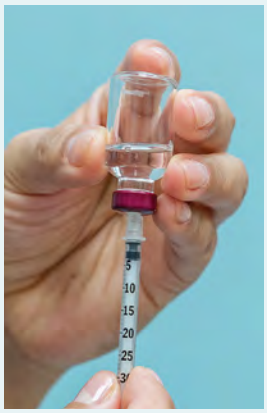
1 Wash your hands with soap and water, gather supplies and wipe the top of the insulin vial with alcohol pad.

2 If you are taking cloudy insulin, gently roll vial in between hands until evenly mixed.

3 Expose the needle by twisting off cap and remove plunger cap by pulling straight off. Pull plunger down to draw air into the syringe equal to the amount of insulin you need.

4 Push the needle through the top of the rubber stopper straight into the vial. Push all the air into the vial.

5 Leave the needle in the insulin vial and turn the vial and syringe upside down. Pull the plunger down slowly and line up to the bottom of the plunger. Look for air bubbles. Air bubbles in the syringe means you will get less insulin. If you have air bubbles push the insulin back into the vial and start from step 3.



6 Check your syringe to make sure you have the correct amount of insulin. Pull syringe and needle out of the vial. Clean the skin with an alcohol pad and allow alcohol to dry completely.

7 Pick up the syringe and hold it like a pencil. Do not let the needle touch anything. Quickly push the needle straight into the skin at a 90° angle. Push the plunger to inject the insulin and hold for 10 seconds before pulling the needle out.

8 Throw away the needle in a sharps container. Once your sharps container is full, seal the cap with tape. Properly dispose of the container.

Injection Using Insulin Pen and Pen Needle

1 Wash your hands with soap and water and gather supplies.

2 Remove the pen cover and wipe the top with alcohol pad. If you are using a cloudy insulin pen, roll the pen in your hands to activate it before placing a needle on it.

3 Pull the paper seal off the pen needle and screw the pen needle onto the insulin pen. Carefully remove the clear outer needle cover and inner needle cover to expose the needle.

4 Check the flow of insulin by dialing up to 2 units and pressing down on the back of the pen until the dial returns to zero. Repeat until insulin drops or a stream of insulin appears.

5 Turn the dial to the insulin dose given to you by your provider.

6 Double check the dose window to make sure you have selected the proper dose. Clean the skin with an alcohol pad and allow alcohol to dry completely.

7 Pick up the insulin pen and quickly push the needle straight into the skin at a 90° angle. Use your thumb or index finger to press down on the dose knob until it goes back to zero. Hold the needle in place for 10 seconds to prevent leaking and pull the needle out.

8 Recap insulin pen needle with outer cover and unscrew pen needle off pen. Throw away the needle in a sharps container. Once your sharps container is full, seal the cap with tape. Properly dispose of the container.

Hypoglycemia: Managing Low Blood Sugar

Hypoglycemia is a condition in which the amount of sugar in the blood is too low. The body needs some sugar in the bloodstream to support your normal brain function. However, if blood sugar levels are too low, problems can occur. Hypoglycemia is defined as a blood sugar level less than 70 mg/dL.

Causes

There are many reasons low blood sugar can occur, including:

- Diabetes medicines such as insulin and sulfonylureas can cause extended low blood sugar. If you take these medicines, you need to continue monitoring closely for hypoglycemia.
- Skipping or delaying meals while you are taking diabetes medicines.
- Drinking alcohol.
- Interactions of diabetes medicines with other medicines.

Hypoglycemia is a serious condition. It can cause you to pass out because the brain is not getting enough sugar. Symptoms usually go away with immediate treatment. Call your doctor **right away** if your symptoms do not go away after you have taken extra sugar for treatment.

Symptoms of Hypoglycemia

Low blood sugar may happen very quickly. It is important for you and anyone close to you to recognize the warning signs of hypoglycemia. You can then act quickly to treat these symptoms:

- Shaking
- Blurred vision
- Fast heartbeat
- Tingling around the mouth or lips
- Cold, pale, moist skin
- Being unresponsive
- Slurring words or garbled speech
- Irritability, or sudden changes in personality
- Drowsiness
- Fatigue
- Confusion
- Hunger
- Sweating

Actions to Treat Low Blood Sugar

1. Test your blood sugar as soon as possible. Always carry your glucose meter with you when you go out. Bring glucose tablets or a fast-acting sugar source with you when you leave your house.
2. If your blood sugar is less than 70 mg/dL, treat with 15 to 20 grams of simple carbohydrates (fast-acting sugar). See the Food and Drinks to Treat Low Blood Sugar listing.
3. Wait 15 minutes and test your blood sugar again. The rule of 15 refers to taking 15 grams of carbohydrates, then waiting 15 minutes to check your blood sugar level again.

4. If your blood sugar is still less than 70 mg/dL, **repeat step 2**.

5. Once your blood sugar is 70 mg/dL or higher, eat a snack or meal containing protein to help keep your blood sugar level above 70 mg/dL. The protein helps to keep the blood sugar level stable.
6. If your blood sugar is still low, less than 70 mg/dL, go to the nearest hospital emergency center.

7. If you have hypoglycemia 1 or more times a week, contact your prescribing doctor as you may need to change your diabetes medicine.

These are general guidelines. Ask your care team if they apply to you.

Food and Drinks to Treat Low Blood Sugar

Each item listed is an example of 15 grams of fast acting carbohydrates.

- ½ cup regular carbonated soda, not diet
- ½ cup fruit juice, like orange or apple
- 4 teaspoons sugar
- 1 tablespoon honey
- 2 tablespoons raisins
- 8 Lifesavers® candies or 10 jellybeans
- 3 to 4 glucose tablets

Preventing Low Blood Sugar

- Eat meals and snacks as instructed. **Do not** skip or delay meals.
- Check blood sugar as instructed.
- Take insulin as directed.
- Always carry some form of fast-acting sugar.
- Monitor your blood sugar during and after exercise, especially with activities that are more vigorous and longer than usual for you.
- Carry a snack containing protein with you in case you have a delayed meal or need to eat after treatment of low blood sugar.

Hyperglycemia: Managing High Blood Sugar

Hyperglycemia is a condition in which the amount of sugar in the blood is too high. The body needs some sugar in the bloodstream. This feeds the cells of the body and supports brain activity. If sugar levels are too high in the body, problems can occur. Hyperglycemia can be defined as a blood sugar level greater than or equal to 180 mg/dL.

Causes

Reasons for high blood sugar may include:

- Taking medicines such as steroids including prednisone, dexamethasone or hydrocortisone.
- Having surgery or a medical condition such as diabetes or infection.
- Having enteral and parenteral nutrition treatments like tube feedings and IV nutrition.
- Eating foods, especially those high in carbohydrates like rice, potatoes, white bread, breaded fried foods, sugar-sweetened beverages, desserts or sweets.

Symptoms of Hyperglycemia

High blood sugar may not always cause symptoms or the signs may be mild. If you are at risk, you need to check your blood sugar regularly as recommended by your diabetes doctor. It is important for you and anyone close to you to know the warning signs of hyperglycemia. It is important to act quickly to treat high blood sugar. Symptoms of hyperglycemia include:

- Hot, dry warm skin
- Thirsty or a cotton mouth feeling
- Frequent need to urinate, especially during the night
- Headache
- Blurred vision
- Muscle aches
- Nausea
- Excessive hunger
- Abdominal pain
- Fruity smelling breath
- Bad odor to urine
- Yeast or urinary tract infections

Managing Diabetes When You are Sick

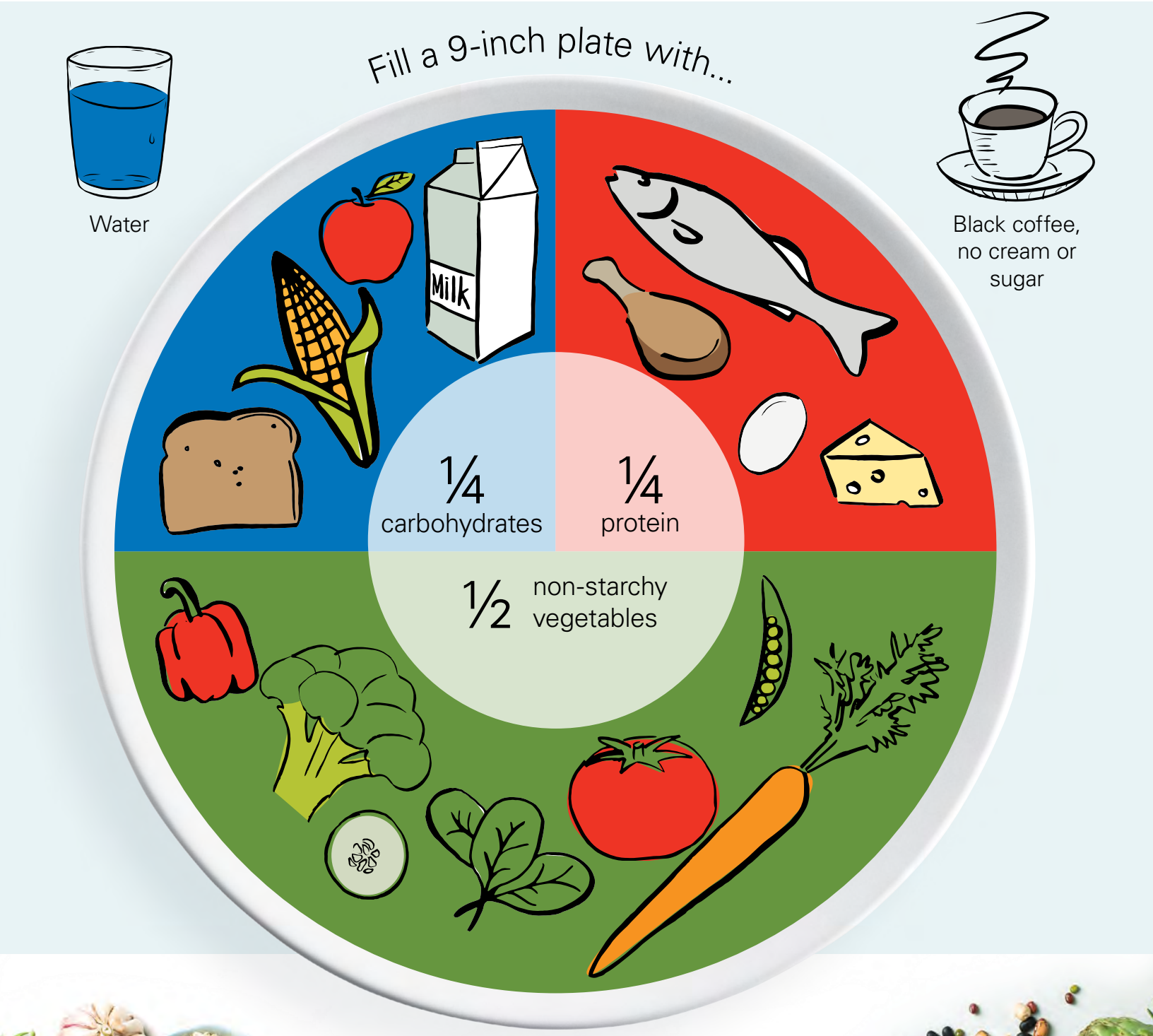
Your liver releases extra sugar into the blood when you are sick. This can cause high blood sugar. Take the following actions when you are sick:

- Check your blood sugar level every 3 to 4 hours.
- Follow your meal plan as best you can. If you cannot eat and have low blood sugar levels, call your diabetes doctor right away.
- If you have type 2 diabetes and you are not able to eat, **do not** take Glipizide or Glyburide since they can increase low blood sugar levels. Be careful when taking medicines like Jardiance®, Farxiga® or Invokana® if you are not eating to prevent ketoacidosis. Call your diabetes doctor **right away** for further instructions if you are taking these medicines and cannot eat.
- Ask your doctor if you should take your diabetes medicine if you are unable to eat.
- Call your doctor if:
  - You begin to vomit and unable to keep down liquids or take your medicines.
  - You are ill longer than 24 hours.
  - Blood sugar levels remain above 240 mg/dL for more than 24 hours.

Diabetic ketoacidosis (DKA) can occur within hours when you do not have enough insulin. If you use insulin, test for ketones every 4 to 6 hours or if your blood sugar is higher than 240 mg/dL. Ketone strips test for the presence and level of ketones in your urine. A color change from beige shows ketones in your urine. The darker the color on the strip, the higher the ketone level. The goal is to have none or trace amounts of ketones. Call your care team if you're positive for ketones.

Diabetes Meal Planning

Use the plate method as a starting guide on managing portion sizes at meals and snacks.



How to Create Your Own Plate

Begin by filling one-quarter of your plate with **protein**. These foods help lower blood sugar levels and help you feel full. 1 ounce (oz.) equals 7 grams (g) of protein. Consider starting with 3 to 4 oz. (20 to 30 g protein) per meal and 1 to 2 oz. (7 to 14 g protein) per snack. Try pairing protein with carbohydrates to help balance blood sugars. For personalized protein needs, ask to meet with a registered dietitian.

Meat or protein | 0 carbohydrate | Limit to 3 to 4 ounces per meal

Beef	1 oz.	Lamb	1 oz.
Beef jerky	½ oz.	Liver	1 oz.
Buffalo	1 oz.	Nut butter, any kind	2 tbsp
Cheese	1 oz.	Nuts, any kind	1 oz.
Chicken	1 oz.	Oysters	6
Cornish hen	1 oz.	Parmesan, grated	2 tbsp
Cottage cheese	¼ cup	Peanut butter	2 tbsp
Duck	1 oz.	Pork	1 oz.
Egg	1	Ricotta	2 oz. or ¼ cup
Egg substitutes	¼ cup	Salmon and tuna, water packed	¼ cup
Egg white	2	Sandwich meats	1 oz.
Fish	1 oz.	Sausage	1 oz.
Ham	1 oz.	Seeds	1 oz.
High-protein milk, also includes 6 to 7 g of carbs, such as Fairlife® or H-E-B Mootopia®	1 cup	Tofu	½ cup
Hot dog	1 oz.	Turkey	1 oz.
Kidney	1 oz.	Veal	1 oz.

Next add **non-starchy vegetables** to one-half of your plate. These foods are low in carbohydrates and have a low impact on blood sugar levels. Non-starchy vegetables are also higher in fiber and help improve fullness.

Non-starchy vegetables | 5 grams of carbohydrate | 1 cup raw or ½ cup cooked

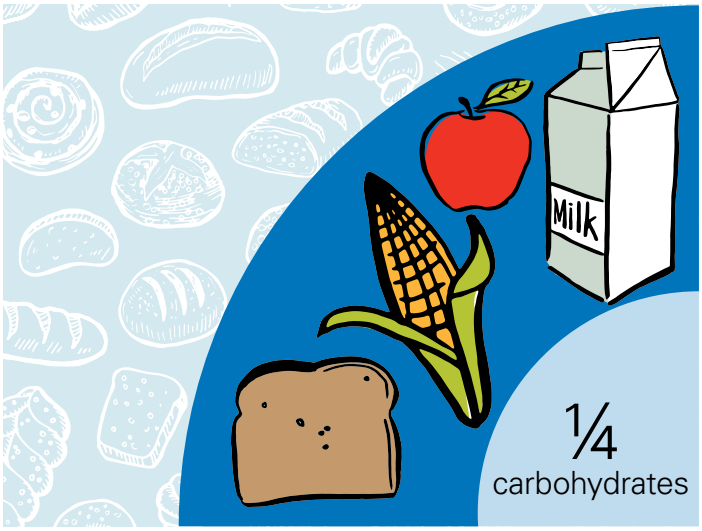
Artichoke	Leeks
Artichoke hearts	Mixed vegetables—without corn, peas or pasta
Asparagus	Mushrooms
Baby corn	Onion
Beans—green, wax	Pea pods—snow peas, sugar snap
Bean sprouts	Peppers
Beets	Radishes
Broccoli	Salad greens
Brussels sprouts	Sauerkraut
Cabbage	Summer squash
Carrots	Tomato
Cauliflower	Tomato sauce
Celery	Tomato juice
Cucumber	Turnips
Eggplant	Water chestnuts
Greens—collard, kale, mustard, turnip, spinach	Watercress
Green onions	Zucchini

Lastly, fill one-quarter of your plate with **carbohydrates**. These foods give you energy, fiber and also raise blood sugar levels. Choose complex carbs such as whole grains, beans, starchy vegetables and fruits.

Each serving listed = 15 grams of carbohydrates.

Per meal, I need: _____

Per snack, I need: _____



Carbohydrates

Starch | 15 grams of carbohydrate

Animal crackers	8	Granola	¼ cup
Baked beans	⅓ cup	Grits, cooked	½ cup
Bagel	¼ of bagel	Hamburger bun or hot dog bun	½
Beans, cooked	½ cup	Lentils, cooked	½ cup
Biscuit	2½ inch	Lima beans	⅔ cup
Bran, dry, wheat	½ cup	Mashed potatoes, cooked	½ cup
Bread	1 slice	Mixed vegetables—with corn, peas or pasta	1 cup
Bread (40 cal)	2 slices	Muffin	small
Cereal, unsweetened ready-to-eat	¾ cup	Noodles	½ cup
Cereal, cooked oats or oatmeal	½ cup	Pancake or waffle	4-inch
Cereal, plain shredded wheat	½ cup	Pasta, cooked	⅓ cup
Cereal, puffed	1½ cups	Peas	½ cup
Cereal, sugar coated	½ cup	Pita	½
Chips—regular, tortilla, potato	1 oz.	Popcorn, cooked	3 cups
Cookies	2	Potato—white or sweet	½ cup
Corn	½ cup	Potato, baked with skin	¼ large (3 oz.)
Cornbread	2-inch	Pumpkin, cooked	1 cup
Couscous	⅓ cup	Rice, cooked	⅓ cup
Crackers	5 to 6	Rice cake	2
Crackers—Oyster	20	Roll	1 oz.
Crackers—Sandwich style	3	Taco shell, 5" across	2
English muffin	½	Tortilla—corn or flour, 6" across	6 inch
French fries	16	Winter squash	1 cup
Graham cracker	3 squares		

Carbohydrates

Fruit | 15 grams of carbohydrate

Apple	1 lunchbox sized	Kiwi large	1
Applesauce, unsweetened	½ cup	Mandarin orange	¾ cup
Apricots	4 small	Mango	½ cup
Banana	1 small (4-inch) or ½ large	Nectarine	1 small
Blackberries	¾ cup	Orange	1 small
Blueberries	¾ cup	Papaya	½ of fruit or 1 cup
Cantaloupe	⅓ of whole or 1 cup cubed	Peach	1 medium
Cherries	12	Pear	1 small
Dates	3	Pineapple, canned	½ cup
Dried fruits	¼ cup or 2 tbsp	Pineapple, raw	¾ cup
Figs	2 medium	Plums	2 small
Fruit cocktail	½ cup	Raisins, mini box	1
Fruit juice	½ cup	Raspberries	1 cup
Grapefruit	½	Strawberries	1¼ cup
Grapes, medium	15	Tangerine	2 small
Honeydew	1 cup cubed	Watermelon	1¼ cup

Milk | 12 grams of carbohydrate

Buttermilk	1 cup	Milk, evaporated	½ cup
Milk, skim, 2% or whole	1 cup	Milk, soy	1 cup
Milk, chocolate	½ cup	Ice cream	½ cup
Milk, dry	⅓ cup	Yogurt, plain	¾ cup

How to Read a Nutrition Label

1 Check the serving size

- There may be more than 1 serving in a package.

2 Check the calories

- Too many calories can lead to weight gain.

3 Limit these

- Limit foods with saturated fat and avoid trans fat.
- Aim for less than 2,400 milligrams of sodium a day.
- Limit your added sugar to 25 grams a day or less for women and 36 grams for men.
- This food contains 46 g of carbohydrates per 1½ cup. Aim for 30 to 45 g of carbohydrates with meals and 15 to 30 g of carbs with snacks.
- Fiber and sugar are included in the total carbohydrates.

4 Get enough of these

- Look for foods that have at least 3 grams of fiber.
- Aim for snacks with minimum 7 to 14 g of total protein and meals with minimum 20 to 30 g of total protein.
- Get your vitamins from food instead of supplements.
- If a food is low in protein or fiber, consider adding on a protein or non-starchy vegetable to increase the amount in a meal.

Nutrition Facts

2 servings per container

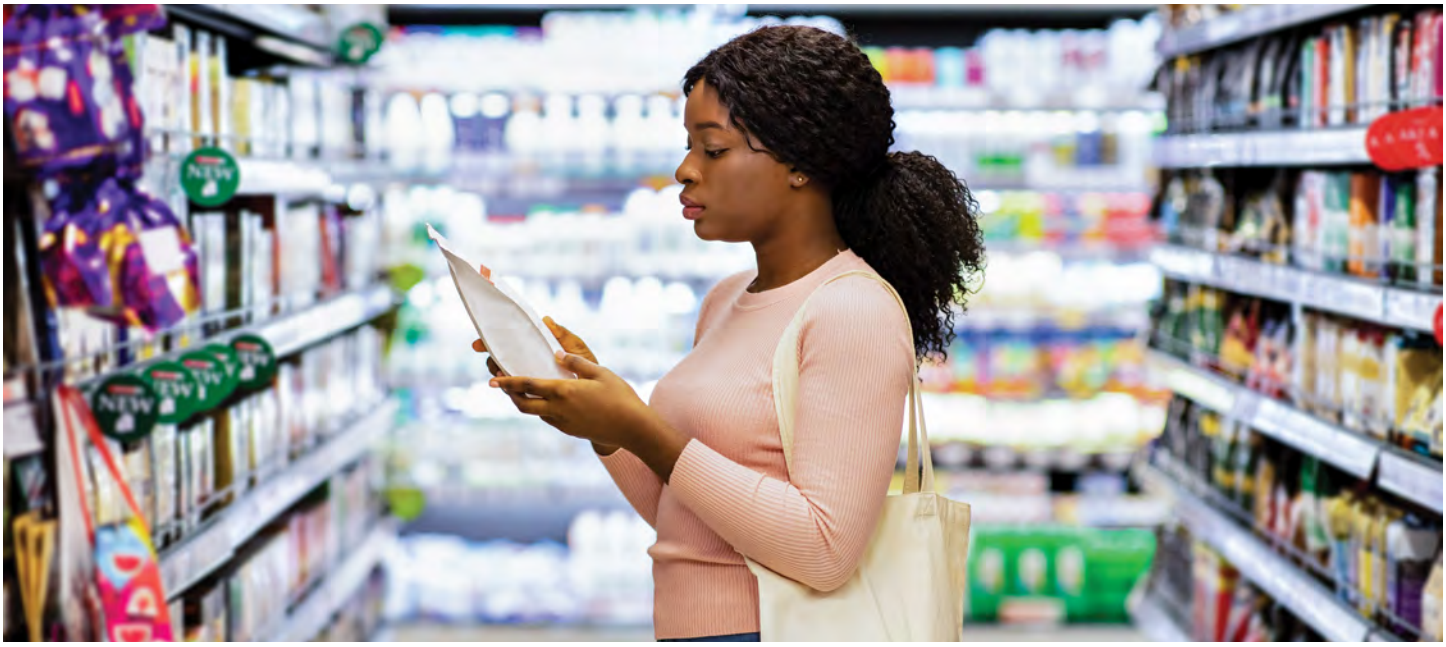
Serving size **1½ cup (208g)**

Amount Per Serving

Calories **240**

	% Daily Value*
Total Fat 4g	**5%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 5 mg	**2%**
Sodium 430mg	**19%**
Total Carbohydrate 46g	**17%**
Dietary Fiber 0g	**25%**
Total Sugars 4g	
Includes 2g Added Sugars	**4%**
Protein 11g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 6mg	35%
Potassium 240mg	6%

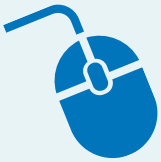
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.



Serving Size Guide

Choose healthy portions to manage your diabetes.

1 cup
the size of
a baseball



½ cup
the size of a
computer mouse

3 ounces
the size of a
deck of cards

⅓ cup
the size of a
pool ball

1½ ounces
the size of four dice

Managing Diabetes During Cancer Treatment Side Effects

It can be challenging to manage blood sugar levels when appetite is affected. You may have side effects of cancer or cancer treatment, such as nausea, vomiting, diarrhea, weight loss and decreased appetite. It is important to speak with your care team to help you create goals to manage your blood sugars as well as symptoms.

Tips for Managing Blood Sugars and Symptoms

- Avoid going a long time without eating. Try to eat often, such as every 2 to 3 hours.
- Take your diabetes medicines as prescribed.
- Eat consistent amounts of carbohydrates throughout the day. For example, aim for 30 to 45 g of carbohydrates at each meal and 15 to 30 g of carbohydrates at each snack.
- If foods such as white bread, white rice and white pasta are more appealing to eat, try to balance them with protein foods.
- If you are able, eat your protein foods first and then carbohydrates second.
- If you cannot eat protein foods at meals and snacks, try protein shakes as an alternative. Speak with a registered dietitian to see which shakes are best for you.
- Move your body for 15 to 20 minutes after meals.
- Drink small sips of water or zero calorie drinks after eating.
- If sweetened carbonated beverages or snacks improve nausea symptoms, try to have them with protein foods such as turkey, cheese, nut butter or nuts.

How to Pair Your Carbohydrates with Protein

Carb-Containing Food	**Each choice below is about 15 grams of carbohydrates.** Choose 1 to 2 choices (15 to 30 g carbohydrates) per snack and 2 to 3 choices (30 to 45 g carbohydrates) per meal.	Protein Foods to Pair with Carb-Containing Foods
Bread or Toast	1 slice bread 1 small tortilla ¼ large bagel	Nut butter Cottage cheese Egg salad Fried egg Melted cheese
Waffles or Pancakes *– Consider choosing higher protein waffle*	1 waffle (4 inch) 1 pancake (4 to 5 inch)	Greek yogurt Nut butter Breakfast meat on the side, sausage, bacon or ham
Cereal	½ cup cooked cereal like oatmeal, cream of wheat or grits ½ to ¾ cup cold cereal	Milk, try high protein options such as Fairlife® or H-E-B Mootopia®* Oral Nutrition Supplement Nuts Nut butter Greek yogurt
Rice	⅓ cup cooked rice	Chicken Ground beef Lamb Pork Egg Tofu Beans or legumes
Pasta	⅓ cup cooked pasta	Meatballs Grilled chicken Ground turkey or pork Beans or legumes
Crackers or Chips	3 to 6 crackers 8 to 12 chips	Hummus Cheese Cottage cheese Nut butter Turkey Tuna salad Egg salad
Fruit	1 small fresh fruit (¾ to 1 cup) ½ medium banana 1 cup melon or berries ½ cup canned or frozen fruit, in their own juices	Nut butter Nuts Cheese Chicken or turkey sausage Greek yogurt Cottage cheese
Starchy Vegetables	¼ large baked potato or ½ cup mashed potato ½ cup cooked beans or legumes 1 cup butternut squash ½ cup corn or green peas	Ground beef Chicken Turkey
Sweets or Desserts	½ cup ice cream 2 small cookies Candy	Deli turkey and cheese roll up Nuts Nut butter Greek yogurt

*Products are not endorsed by The University of Texas MD Anderson Cancer Center. This list serves to help you assess products for your use.

Managing Diabetes While in the Hospital

All patients admitted with type 1 diabetes, or those utilizing insulin pumps or continuous glucose monitoring (CGM) systems, should have consultation with the Endocrine-Diabetes team upon admission.

If you are admitted to the hospital, the goal for glucose control is to maintain sugars between 100 to 180 mg/dL. Sometime, the medicines you use for diabetes management may not be best for use during your inpatient stay. Your hospital admitting team will make adjustments to your glucose management plan during your hospital stay. They will also provide updated instructions for your diabetes management when you are discharged from the hospital.

Using Your Own Insulin Pump or Continuous Glucose Monitor (CGM)

Patients using an insulin pump or CGM are allowed to continue using their pump in the hospital as long as it is safe to do so. Safety will be determined by the Endocrine-Diabetes team. You must have a good working knowledge on how to operate the pump by yourself.

Planning Ahead

You will need to bring all of your supplies for your pump or CGM with you to the hospital. Fingerstick glucose monitoring may still be required one time a day for patients using a CGM based on hospital policy. If you chose to use your insulin pump or CGM during your hospital stay, you will be asked to sign an agreement form.

Selecting Your Meals

There are special hospital diets available for patients with diabetes. These food plans can help maintain good glucose control. Options may include a 'no concentrated carbs' diet or a 'calorie-restricted' diet which limits ordering sugar-sweetened choices. It is important to talk to your admitting team to determine which type of diet is best for you.

All inpatient menus and the meal tray ticket list the number of carbs for each item ordered. This can help you make better food choices during your inpatient stay.

Notes

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Notes

Diabetes Management During Cancer Treatment

Revised 09/2025, Patient Education