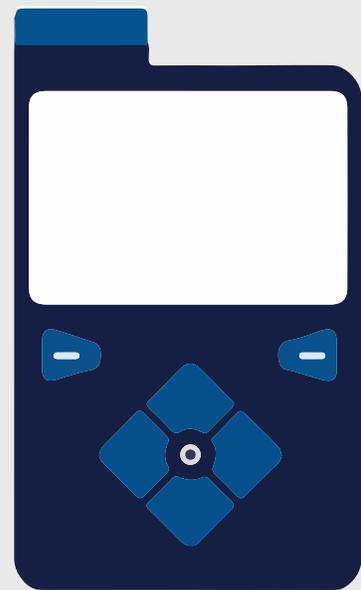


# THE BASICS

DIABETES,  
INSULIN PUMP THERAPY  
AND CARB COUNTING





## THE BASICS

### DIABETES, INSULIN PUMP THERAPY AND CARBOHYDRATE COUNTING

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## Introduction

When you have diabetes, and need to take insulin every day, an insulin pump is a great tool to help manage your insulin and blood glucose (sugar) levels.

This booklet will teach you the basics of:

1. Diabetes and How the Body Works
2. Insulin Pump Therapy
3. Carbohydrate Counting

Learning these concepts will help you better manage your glucose levels and be successful with insulin pump therapy.

### MEET LAURA...

Laura is a person living with diabetes. You will notice references to her throughout this guide that may help you further understand some of the concepts presented.

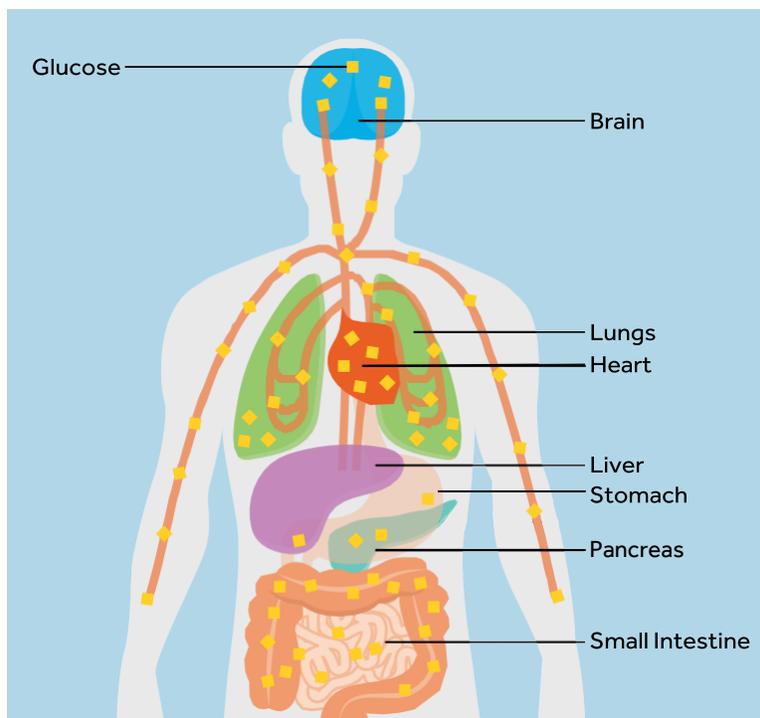
## Section 1: Diabetes and How the Body Works

### What is Diabetes?

Diabetes is a condition in the body where blood glucose levels are higher than normal. This can happen when the body either doesn't make any insulin (type 1 diabetes), doesn't make enough insulin (type 2 diabetes) or the insulin that the body makes doesn't work well (more common in type 2 diabetes). To better understand what diabetes is and how to treat it, it helps to learn about how the body works.

### Glucose – The Body's Fuel

The body is made up of millions of cells, and every cell needs energy. Your body uses glucose, a form of sugar, for energy. You need some glucose in your body at all times to live, even while you sleep.



Every cell in the body uses glucose for energy



Glucose is the fuel your body uses for energy. Just like most cars need gas to run, the body needs glucose to work.

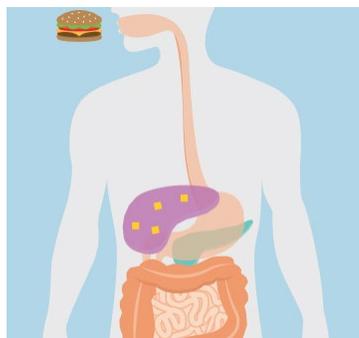
## How the Body Gets Glucose for Energy

When you eat, food travels into your stomach and digestive system. There, food is broken down into nutrients, one of which is glucose. Then glucose gets absorbed into the bloodstream.

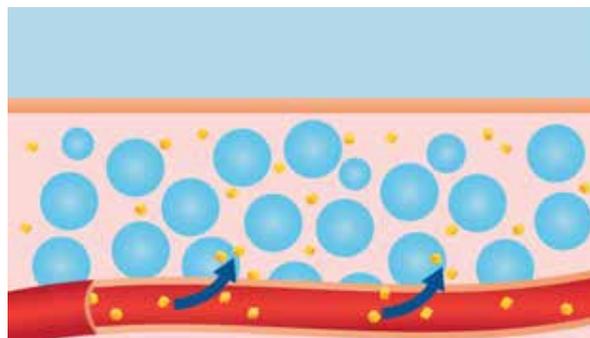
Once in the bloodstream, glucose moves into the fluid that surrounds all your tissues and cells. This fluid is called the interstitial fluid.



Food



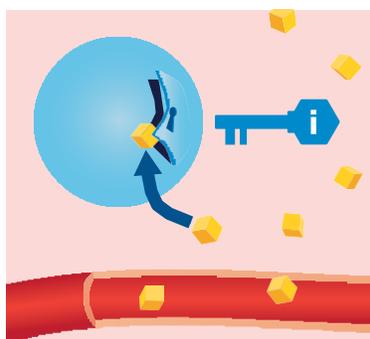
Digestive System



Glucose moving from bloodstream into the Interstitial Fluid

After glucose enters the interstitial fluid, it moves into your cells with the help of a hormone called insulin. Insulin is the 'key' that unlocks the cell and allows glucose to enter. This gives your body the fuel it needs.

### Insulin Acts as a Key



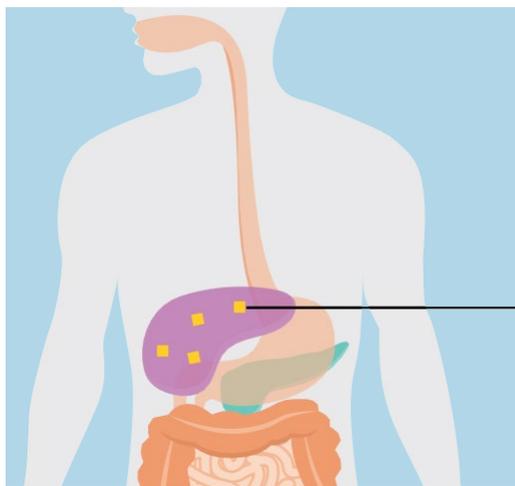
Glucose moves into your cells with the help of insulin



Insulin is the key that moves glucose inside your cells, so your body has energy to live.

# DIABETES

Extra glucose that is not needed for energy right away is stored in the liver. Larger amounts of glucose that the liver cannot store get turned into fat for storage.



Glucose stored in the liver

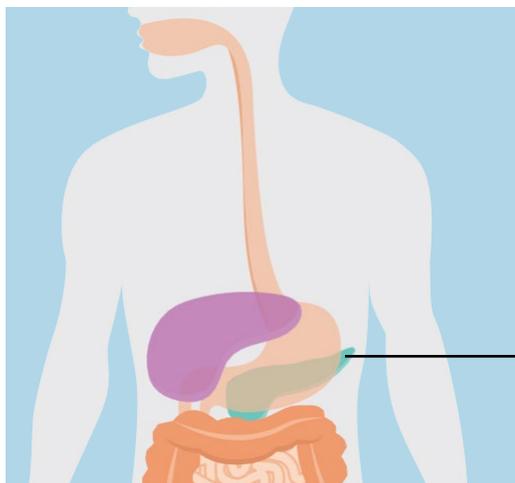


Just like a car stores extra gas in its tank, your body stores extra fuel in your liver.

The liver releases glucose back into the blood stream when a person needs energy and has not eaten for a while. The liver can also make glucose. This happens during periods of fasting (overnight and between meals) and during and after activity.

## Insulin

Insulin is a hormone made by the pancreas. Insulin lowers blood glucose levels by allowing glucose to move out of the blood and into your body's cells.



Insulin lowers glucose levels

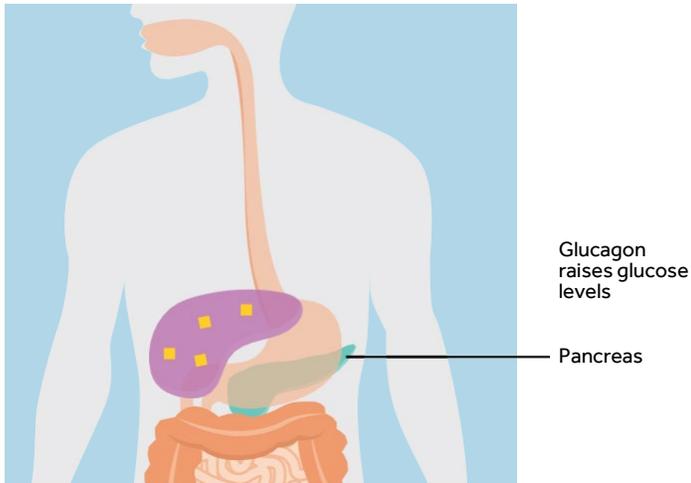
Pancreas

The pancreas releases insulin 24 hours a day. The insulin is released in two ways: A small amount (basal level) of insulin is released in between meals and overnight. A larger amount (a bolus) of insulin is released after eating.

When you have diabetes, you may not make any insulin or not make enough insulin. So, you rely on injectable insulin to lower your glucose levels.

## Glucagon

The pancreas makes another hormone called glucagon. You can think of glucagon as the opposite of insulin, because glucagon raises glucose levels.



When the pancreas in a person without diabetes senses that glucose levels are dropping too low, it releases glucagon. Glucagon tells the liver to release some of the glucose it stored, back into the blood stream. As the glucose enters the bloodstream, blood glucose (BG) levels start to rise. People living with diabetes can often experience ineffective glucagon release.



The pancreas makes two hormones that help to keep glucose levels in balance – insulin and glucagon.

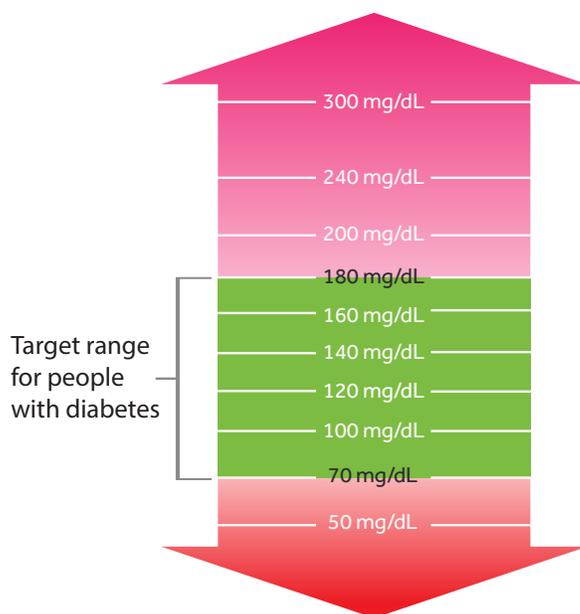
## Check Your Knowledge! (Choose the best answer)

1. The body's main source of fuel or energy is:
  - A. protein
  - B. fat
  - C. glucose
  
2. \_\_\_\_\_ is the 'key' that unlocks the cell and allows glucose to enter. This gives your body the fuel it needs.
  - A. carbs
  - B. insulin
  - C. water
  
3. Glucose your body does not use right away is stored in the \_\_\_\_\_.
  - A. liver
  - B. pancreas
  - C. heart

Answers: 1. C 2. B 3. A

## Glucose Levels in the Blood

A person who does not have diabetes usually has glucose levels from 70 mg/dL to 140 mg/dL. When you have diabetes, it is very difficult to keep glucose levels within such a tight range. A target glucose range for most people with diabetes is from 70 mg/dL to 180 mg/dL. It is important to keep your glucose levels within your target range and try to avoid highs and lows. Your healthcare professional will help you decide the best glucose range for you.



When you use your insulin pump and glucose sensor, your pump can help you track how much of the time your glucose levels are within the target range of 70 mg/dL to 180 mg/dL. This is called Time in Range.

### TIME IN RANGE

Now that Laura is on the pump and sensor, she tracks her Time in Range. Last month she increased her time spent between 70 mg/dL and 180 mg/dL from 60% to 70%. This means she spent 2.4 more hours a day in range.



<b>ADA Recommendations</b>	<i>Before Meals</i> 80-130 mg/dL	<i>After Meals</i>	less than 180 mg/dL
<b>AACE Recommendations</b>	<i>Before Meals</i> less than 110 mg/dL	<i>After Meals</i>	less than 140 mg/dL
<b>Time in Range Recommendations</b>	70% time spent between 70-180 mg/dL <sup>1</sup>		

## Managing High and Low Glucose Levels with Diabetes

When you have diabetes, it's important to try to avoid high and low glucose levels. High and lows don't feel very good in the moment, and they can damage your body in the long run.

### High Glucose:

When you eat a meal, glucose levels start to rise. If there is not enough insulin in the body, glucose can't effectively move into the cells. In this case, glucose will stay in the blood and interstitial fluid. More insulin is needed to lower blood glucose levels.



Too much glucose  
Not enough insulin



High blood glucose



More insulin needed

### Low Glucose:

When there is more insulin in the body than is needed, and there is not enough glucose, glucose levels will drop. It's important to drink or eat sugar to make blood glucose levels go back up to target range.



Too much insulin  
Not enough glucose



Low blood glucose



Must drink or eat sugar



If glucose is so low that you cannot eat or drink sugar, someone can give you an injection of glucagon. Glucagon also comes in nasal spray powder. Glucagon makes the liver release glucose into the blood, and glucose levels will rise. Your healthcare provider may give you a prescription of glucagon and review administration instructions with your friends/family.

## Maintaining Glucose Levels in Range with Diabetes

The goal in managing diabetes is to take the right amount of insulin at the right time to balance the amount of glucose in your body. This can be difficult to do sometimes, but the use of technology (insulin pumps, continuous glucose monitors, smart pens) can help improve glucose levels and achieve more Time in Range for people living with diabetes. Keeping your glucose in target range will help you feel your best



Insulin and glucose in balance



Glucose levels in target range

## Check Your Knowledge! (Choose the best answer)

1. Insulin helps to \_\_\_\_\_ blood glucose levels.
  - A. raise
  - B. lower
  
2. Glucagon helps to \_\_\_\_\_ blood glucose levels by telling the liver to release stored glucose into the blood.
  - A. raise
  - B. lower
  
3. When you have diabetes, you must always eat or drink something with sugar if your glucose gets low.
  - A. True
  - B. False

Answers: 1. B 2. A 3. A

## Section 2: Basics of Insulin Pump Therapy

### Insulin Delivery Using a Pump

A pancreas in a person without diabetes releases small amounts of insulin frequently throughout the day and night, and larger amounts when the person is eating food. An insulin pump acts like a pancreas by delivering insulin in two ways: basal and bolus.

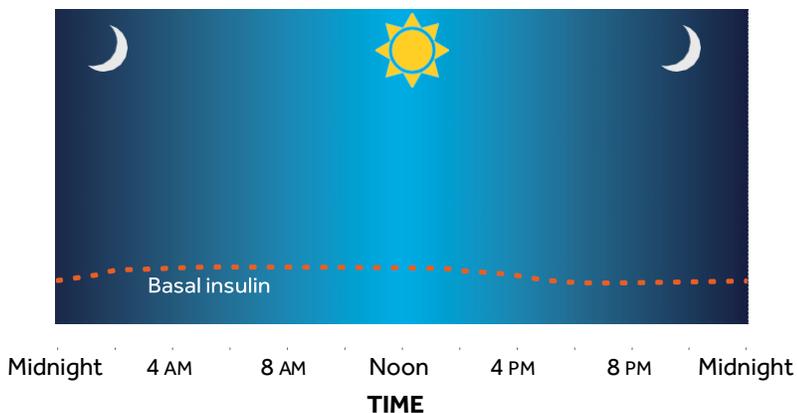


Insulin pumps hold several days' worth of insulin and only use rapid-acting insulin, like Humalog® or NovoLog®.

No long-acting insulin is needed when you use an insulin pump.

### Basal

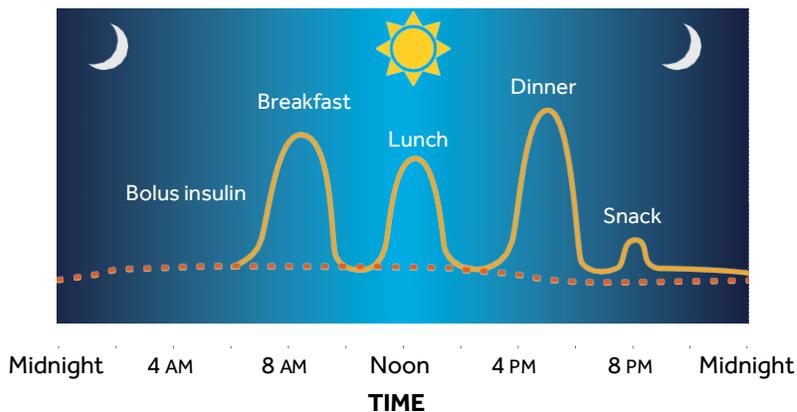
The pump automatically releases rapid-acting insulin every few minutes, 24 hours a day. This is the basal rate, which you can think of as 'background' insulin delivery. The pump's basal insulin delivery is meant to match the liver's steady release of glucose between meals and while you sleep.



Basal – matches the liver's steady release of glucose

## Bolus

A bolus is a larger dose of insulin given by you when you eat food, or any time you have a high blood glucose (BG) value. This extra insulin is meant to match the rise in blood glucose levels. This delivery allows the glucose to enter your cells.

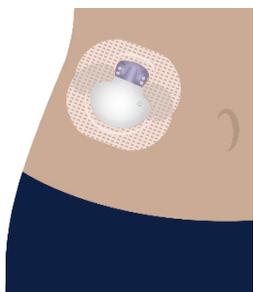


Bolus – matches the rise in glucose levels, for example, after you eat

## Insulin Pump Therapy and Glucose Monitoring



When you use an insulin pump, it is important to check your blood glucose regularly.



Some people also use a continuous glucose monitor (CGM). This is a sensor that lets a person continuously know their interstitial glucose levels with a new value every 5 minutes. We call this the sensor glucose (SG) value.

## Hybrid Closed Loop Systems

Hybrid Closed Loop systems have two modes -- Manual Mode and SmartGuard™ Auto Mode. In Manual Mode, the system operates like a traditional pump. In SmartGuard™ Auto Mode, it can automatically adjust some insulin.

### Manual Mode

Your pump has basal and bolus settings that your healthcare professional will help you program. When you use your pump in this way, it is in Manual Mode.



### Basal Rate

The pump releases small amounts of insulin every few minutes, 24 hours a day, based on basal rates you and your healthcare provider decided to program into your pump. You can set different basal rates during the day and night to better match your body's needs.



Single Basal Rate



Multiple Basal Rates

### Bolus Delivery

You can give extra insulin (bolus) on demand when you want to eat a meal. This can be done with the preset bolus or manual bolus if you're not counting carbohydrates (carbs). The Bolus Wizard™ feature can be used by entering grams of carbs to calculate how much insulin to take. A correction bolus can also be calculated with the Bolus Wizard™ if the blood glucose level is high.

### SmartGuard™ Auto Mode

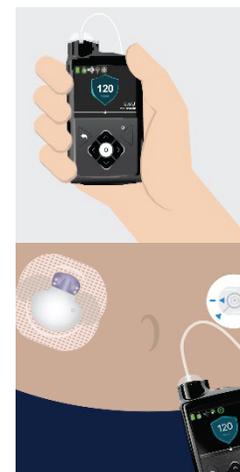
#### Basal Rate

When your pump is not in Manual Mode, it is in SmartGuard™ Auto Mode. The pump automatically adjusts basal insulin delivery every 5 minutes based on your sensor glucose levels.



Basal insulin adjusting every 5 minutes

We call this technology SmartGuard™ Auto Mode because it automatically adjusts insulin delivery. Since insulin is adjusted based on sensor glucose levels, a person must wear a continuous glucose monitor (CGM).



## *Bolus Delivery*

Bolus delivery in SmartGuard™ Auto Mode is very similar to Manual Mode, however preset bolus and manual bolus are not available. Use of the Bolus Wizard™ is the best way to assure accurate and precise bolus amounts. The carb ratio can be adjusted based on your actual needs.

- When you want to eat food:
  1. Enter the grams of carbs you are eating into the pump
  2. Tell the pump to deliver a bolus
- When you want to correct a high BG value
  1. Enter the BG value into the pump. SmartGuard™ Auto Mode will calculate how much insulin (it thinks) your body needs at that time.
  2. Tell the pump to deliver a bolus



Think of SmartGuard™ Auto Mode as your **co-pilot** when you are **awake** — assisting you with your basal rate adjustments while you decide how much insulin to take for meals. Think of SmartGuard™ Auto Mode as your **auto-pilot** when you are **asleep** — gradually adjusting your insulin delivery to help keep your glucose levels in range.

## How Pump Therapy Compares to Injections

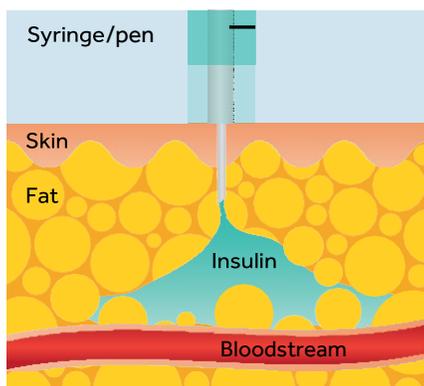
Here are a few ways that insulin pump therapy compares to injections:

### 1. Insulin Absorption

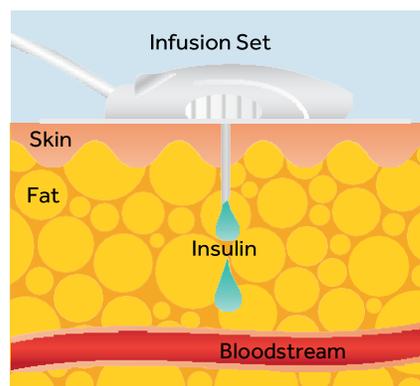
When taking multiple daily injections, people with type 1 diabetes and many people with type 2 diabetes need both long-acting insulin and rapid-acting insulin. When using a pump, only rapid-acting insulin is needed.

The disadvantage of using long-acting insulin is that the large volume of insulin pools under the skin and is less consistently absorbed day-to-day. This can lead to less predictable glucose levels.

The advantage of using rapid-acting insulin is that smaller amounts of insulin are delivered, so the body has more consistent absorption day-to-day, which helps glucose levels be more predictable.



Long-acting insulin can "pool" under the skin leading to inconsistent absorption



Rapid-acting insulin is delivered in tiny amounts, so it absorbs more consistently

### 2. Changing or Stopping Insulin Delivery



With long-acting insulin, you cannot take back the insulin once you have injected it. It's there working in your body whether you want it to or not. This can sometimes cause lows especially during and after exercise.

With an insulin pump, you can easily change the amount of basal insulin you receive using Temporary Basal rate and stop a food or correction bolus if needed. In a pump system with SmartGuard™ Auto Mode, the pump will automatically deliver less insulin or stop your insulin delivery completely when it senses your glucose levels dropping. Lowering or stopping your basal insulin delivery may help avoid lows, especially during and after exercise. SmartGuard™ Auto Mode can also increase basal rates in response to rising glucose levels, up to a maximum amount that is determined safe by the pump.

### 3. Convenience of Having Your Insulin With You



With multiple daily injections, it's easy to forget your insulin at home, and unfortunately if you are going to eat, this means you must skip a dose of insulin which almost certainly leads to high glucose levels.

With an insulin pump, you always have your insulin with you to bolus for food or to correct a high BG. Always having your insulin there when you need it is convenient and helps you avoid highs and better manage your glucose levels.

### 4. Easy and Accurate Bolus Doses

With multiple daily injections, unless you use a Smart Pen, you need to calculate the amount of insulin you need at each meal. An insulin pump can help do that math for you by using the Bolus Wizard™ feature. You simply enter your blood glucose level as well as the amount of carbs you're about to eat and the pump will calculate the food bolus along with any correction insulin you may need.

## Staying Safe with Insulin Pump Therapy



There are many advantages of using an insulin pump, but you need to stay safe while using one. The pump uses only rapid-acting insulin which doesn't stay in your body for long. Your glucose levels can rise quickly if basal insulin is stopped or if your pump becomes disconnected without you knowing it. It is important to monitor glucose levels when using a pump. If a high glucose occurs, it is best to always check the infusion site as it may need to be replaced.

## Why Insulin Pump Therapy?

Insulin pump therapy may make managing your glucose levels easier, so you can spend time enjoying life and worrying less about diabetes.

### LIFE WITH A PUMP

When Laura started using Hybrid Closed Loop Therapy, her life changed. She now eats when she wants to, not when she has to. Her pump can adjust the amount of insulin she gets every 5 minutes to better match what her body actually needs. With an insulin pump, managing her diabetes is a whole lot easier.

## Check Your Knowledge! (Choose the best answer)

1. What type of insulin is used for insulin pump therapy?
  - A. Long-acting insulin
  - B. Rapid-acting (U100) insulin
  - C. Basal insulin
  
2. A pump with **SmartGuard™ Auto Mode** can automatically adjust insulin levels every 5 minutes.
  - A. True
  - B. False
  
3. I still need to bolus for carbs if I use a pump with SmartGuard™ Auto Mode.
  - A. True
  - B. False

Answers: 1. B 2. A 3. A

## Section 3: Carbohydrate Counting

Food is made up of protein, fat and carbohydrate (carb). When carbs are digested, they get broken down into glucose, which makes blood glucose levels go up. Carb counting is adding up the grams of carbs you want to eat, so that you can give the right amount of insulin for the food you eat.

### Why Count Carbs?

- Match your insulin to the food you want to eat
- Better manage glucose levels to avoid highs and lows

### Counting carbs with an Insulin Pump

- Tell your pump how many carbs you are eating before you begin to eat. The pump will estimate how much insulin to take using its calculator
- Especially when using a pump with SmartGuard™ Auto Mode, you should tell your pump how many grams of carbs you want to eat 10-15 minutes before you eat them



Your healthcare professional will help you figure out your insulin dose based on how many carbs you are eating.

## Carb Counting Tools

One of the most important parts of carb counting is knowing how much of a certain food you are eating. You can use:

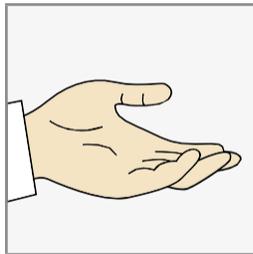
### Measuring Cups and Spoons

Measuring cups, spoons or a food scale are helpful tools for practice. Measuring helps give you a good visual idea of how different serving sizes look like on a plate, bowl or glass which helps you to better estimate when you are not at home.

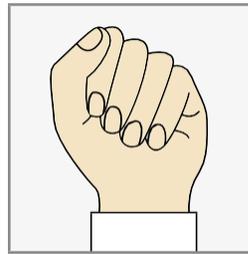


### Your Hands

Your hands can also help you estimate portion sizes, especially when you are away from home.



Cupped hand = 1/2 cup



Fist = 1 cup

Other Resources that you may find helpful:

- MyFitnessPal -- Calorie Counter & Diet Trackers
- CalorieKing Food Search app, or [www.calorieking.com](http://www.calorieking.com)
- Figwee Calorie Counter app – carbohydrate portion visualization tool
- Carb Counting with Lenny<sup>SM</sup> game and app for children
- American Diabetes Association [www.diabetes.org](http://www.diabetes.org)

## Methods for Carbohydrate Counting

There are different ways to count carbohydrates. You may use one or a combination of the different methods.

### Estimating Carbohydrates – 15-gram servings

Estimating carbs is based on serving sizes that have about 15 grams of carbohydrate. This method can be helpful when you are, for example, eating at a restaurant and no food labels or nutrition information is available.

Here are food groups and serving sizes that contain approximately 15 grams of carbs:



#### Starches

- |   |                              |                  |
|---|------------------------------|------------------|
| 1 slice of bread  | 6 crackers                   | 6-inch tortilla  |
| 1/2 cup cooked grits  | 1/3 cup cooked rice or pasta | 1/4 bakery bagel |
| 1/2 cup starchy vegetables, like corn, peas, beans, lentils |                              |                  |



#### Fruits and fruit juices

- |                      |                                     |
|----------------------|-------------------------------------|
| 1/2 cup juice        | 1 tennis ball-sized apple or orange |
| 1/2 of 9-inch banana |                                     |



#### Milk and yogurt

- 1 cup milk (skim, low-fat or whole)
- 1 cup plain low-fat yogurt



#### Sweets, desserts and other carbohydrates

- |                             |                   |                              |
|-----------------------------|-------------------|------------------------------|
| 2" square of unfrosted cake | 1/2 cup ice cream | 1 tbsp honey, syrup or jelly |
| 1 small cookie              |                   |                              |

For a more complete list of foods and 15 gram servings, see page 26.

## Nutrition Labels

Reading Nutrition Facts labels is very helpful when counting carbs. Even though there are many items on a Nutrition Facts label, there are only two things that you should focus on when it comes to counting carbs:

### 1. Serving Size:

First check the serving size shown on the label.

You may be eating more than the amount listed as the serving size. For example, if the serving size is 1/2 cup and you are eating 1 cup, then you are eating two servings. Also note if the serving size is the uncooked or cooked food. This will make a difference for foods such as rice and noodles.

### 2. Total Carbohydrates grams (g):

Check the total grams of carbohydrate to get the complete picture of the effect on your glucose levels. For this food:

- 1/2 cup serving = 36 grams of carbs
- 1 cup serving = 72 grams of carbs

<b>Nutrition Facts</b>	
<b>8 servings per container</b>	
<b>Serving size</b>	<b>1/2 cup (42g)</b>
<b>Amount per serving</b>	
<b>Calories</b>	<b>230</b>
<b>% Daily Value*</b>	
<b>Total Fat</b> 8g	<b>10%</b>
Saturated Fat 1g	5%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 160mg	<b>7%</b>
<b>Total Carbohydrate</b> 36g	<b>13%</b>
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
<b>Protein</b> 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	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.

An example and not a real item.



Sugar free does not mean carbohydrate free. Always check the label for **Total Carbohydrate**.

## CARB COUNTING WITH AN INSULIN PUMP

Because Laura counts carbs, she has more freedom when making food choices. She knows that when she adds up her carbs, her pump will estimate the amount of insulin she needs for the food she is eating. Carb counting and her insulin pump help keep her glucose levels in target range.

## Carb Meal Size

Your healthcare provider may ask you to guess how many grams of carbs you are eating based on your meal's carb size.

When you examine your meal sizes and their carb content, you may be able to come close to knowing how many grams of carbs you are eating by guessing your "carb meal size."

For example, a healthcare professional may help one person figure out that a typical small carb snack might be about 15 grams of carbs. A small carb meal might be 30 grams of carbs, a medium carb meal might be 60 grams of carbs, and a large carb meal might be about 90 grams of carbs. Another person, for example, might have different carb meal sizes, where small is 30 grams of carbs, medium is 45 grams of carbs and large is 60 grams of carbs.



15 grams of carbs  
(1 small piece of fruit)



30 grams of carbs  
(2/3 cup rice)



75 grams of carbs  
(3 small tortillas,  
1/3 cup beans,  
1/3 cup rice)



90 grams of carbs  
(2 cups of pasta)



Whatever your method of estimating carbs is, work with your healthcare professional to pick the one that works for you and makes managing your glucose levels easier.

## Protein and Fat

Carbohydrates impact glucose levels the most, but protein and fat (especially in large quantities) can affect glucose levels in some people. Foods that contain mostly protein and fat include: eggs, meat, seafood, cheese, oils, and nuts.

### Protein

There are increasing numbers of people eating more protein and limiting their carbohydrates in an effort to manage their glucose levels. According to the American Diabetes Association, glucose response to protein is different among individuals. If you think you would benefit from taking insulin with large protein meals, check your glucose more often and discuss with your healthcare professional.

### Fat

Fat slows down digestion, which affects glucose levels. So, the carbohydrates eaten along with the fat move into the blood stream more slowly. For a person eating food with a high amount of fat and carbohydrates, such as a quesadilla, pizza, or fast food, they may need to deliver some insulin up front and then spread the rest of their insulin out over time. This can be done using the Dual Wave™ bolus in Manual Mode.



Example: 2 slices of pizza

- One option in SmartGuard™ Auto Mode is to bolus for 50% of the carbs in advance of eating, and bolus for the remainder in an hour.
- Another option in SmartGuard™ Auto Mode is to bolus for 100% of the carbs in advance of eating, and check glucose levels after 1-2 hours and give a correction bolus if SmartGuard™ Auto Mode recommends one.

## Check Your Knowledge! (Choose the best answer)

1. Which of these foods contain carbohydrates that should be counted?

Corn	Potato	Rice	Crackers
Sugar-free cookies	Honey	Bread	Diet soda
Skim milk	Coffee (black)	Tuna	Cheese
Green beans	Turkey	Cereal	Popcorn
Apple juice	Pinto beans	Orange	Lemonade
French fries	Margarine	Yogurt	Broccoli

2. Write True or False next to each statement:

\_\_\_\_\_ You should always try to avoid eating carbohydrates.

\_\_\_\_\_ Selecting healthy carbohydrates and being careful about portion sizes will provide your body with valuable nutrients.

\_\_\_\_\_ The more carbs you eat, the more insulin you need.

3. Which two things should you focus on when using a nutrition label to count carbs?

- A. Fiber
- B. Sodium
- C. Serving Size
- D. Total Carbohydrates

# CARB COUNTING

4. Use the label to answer the following questions:

One serving equals:

- A. 1 package
- B. 2 bars
- C. 6 bars

2 bars = \_\_\_\_\_ grams of carb

1 bar = \_\_\_\_\_ grams of carb

3 bars = \_\_\_\_\_ grams of carb

<b>Nutrition Facts</b>	
6 servings per container	
<b>Serving size</b>	<b>2 Bars (42g)</b>
<b>Amount per serving</b>	
<b>Calories</b>	<b>160</b>
<b>% Daily Value*</b>	
<b>Total Fat</b> 8g	<b>10%</b>
Saturated Fat 1g	5%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 160mg	<b>7%</b>
<b>Total Carbohydrate</b> 36g	<b>13%</b>
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
<b>Protein</b> 3g	

An example and not a real item.

Answers: 1. Corn, Potato, Rice, Crackers, Sugar-free cookies, Honey, Bread, Skim milk, Cereal, Popcorn, Apple juice, Pinto beans, Orange, Lemonade, French fries, Yogurt,  
2. False, True, True 3. C, D 4. B, 36, 18, 54

## Estimating Carbohydrates – 15 gram servings

This list shows the serving sizes of various foods that contain 15 grams of carbohydrate. You can look for the foods you commonly eat and become familiar with the serving size that equals 15 grams.

### Starches

Each serving listed contains about 15 grams of carbohydrate

Bagel, 4" across	1/2 (1 oz)
Biscuit, 2 1/2" across	1
Bread (white, wheat, rye)	1 slice
Cornbread, 2" cube	1
Croutons	1 cup
English muffins	1/2 muffin
Hamburger/ hot dog bun	1/2 bun
Pancake, 4" across	2
Pita, 6" round	1/2
Popcorn	3 cups
Roti/chapati, 6" round	1
Roll, small	1
Snack chips (potato, tortilla)	9-15
Stuffing, prepared	1/4 cup
Tortilla, 6" across	1
Waffle, 4.5" square/round	1

### Other Starches

Each serving listed contains about 15 grams of carbohydrate

Brownie, 2" square	1
Cake, unfrosted, 2" square	1
Cake, frosted, 2" square	1/2
Cookie, small	1
Gelatin, regular	1/2 cup
Honey	1 tbsp
Jam, regular	1 tbsp
Pudding, regular	1/4 cup
Salad dressing, reduced calorie	2 tbsp
Sherbet, sorbet	1/4 cup
Syrup, light	2 tbsp

### Starchy Vegetables

Each serving listed contains about 15 grams of carbohydrate

Baked beans	1/4 cup
Beans (garbanzo, pinto, black, white)	1/3 cup
Corn	1/2 cup
Corn on the cob, 6" ear	1
Lentils	1/3 cup
Lima beans	1/2 cup
Mixed vegetables	1 cup
Peas (green, split, black-eyed)	1/2 cup
Potato, 3 oz	1
Potato, mashed	1/2 cup
Squash, winter	3/4 cup
Yam/sweet potato, mashed	1/3 cup

### Combination Foods

Each serving listed contains about 15 grams of carbohydrate

Chili with beans	1/2 cup
Soup (cream, broth)	1 cup
Split pea soup	1/2 cup
Thin crust pizza 1/8 of 12"	1 slice
Macaroni and cheese	1/2 cup
Lasagna, 4" x 4"	1/2 piece

### Fruit Juice

Each serving listed contains about 15 grams of carbohydrate

Apple, grapefruit, orange and pineapple	1/2 cup
Cranberry, grape, and prune	1/3 cup
Cranberry juice cocktail, reduced calorie	1 cup

# CARB COUNTING

## Cereal and Grains

Each serving listed contains about 15 grams of carbohydrate

Bran cereals	1/3 cup
Cereals, cooked	1/2 cup
Cereals, unsweetened, ready-to-eat	3/4 cup
Granola, low fat	1/4 cup
Grits/oats, cooked	1/2 cup
Pasta, cooked	1/3 cup
Puffed cereal	1 1/2 cup
Rice, white/brown, cooked	1/3 cup

## Fruit

Each serving listed contains about 15 grams of carbohydrate

Apple, small	1 (4 oz)
Apricots, dried	4 pieces
Banana, 9"	1/2
Blackberries/blueberries	3/4 cup
Cantaloupe/honeydew cubes	1 cup
Cherries	12 (3 oz)
Fruit, canned in juice/light syrup	1/2 cup
Grapefruit, medium	1/2 (11 oz)
Grapes, small	15 (3 oz)
Kiwi, large	1 (3 1/2 oz)
Orange, small	1 (6 1/2 oz)
Peach, medium	1 (4 oz)
Pineapple, fresh	3/4 cup
Plums, small	2 (5 oz)
Raisins	2 tbsp
Raspberries	1 cup
Strawberries, whole	1 1/4 cups
Watermelon	1 1/4 cups

Adapted from: Basic Carbohydrate Counting [brochure], American Diabetes Association, Inc. and American Dietetic Association; 2003. Kulkarni K. Warshaw HS. Why count carbs? In: Landrum S, ed. Complete Guide to Carb Counting, 2nd ed. Alexandria, VA. American Diabetes Association; 2004: 211-255.

## Milk

Each serving listed contains about 12 grams of carbohydrate

<b>Milk:</b>	
Fat free, 1%, 2% or whole	1 cup
Buttermilk	1 cup
Evaporated Milk	1/2 cup
<b>Yogurt:</b>	
Flavored, fat-free, light	2/3 cup (6 oz)
Plain, fat-free	1 cup
Plain	1 cup

## Non-starchy vegetables

One cup raw or 1/2 cup cooked serving of vegetables contains about 5 grams of carbohydrate (not all people count non-starchy vegetables)

Artichoke
Asparagus
Beans (green, wax)
Broccoli
Cabbage
Carrots
Cauliflower
Celery
Cucumber
Greens (collard, mustard)
Mushroom
Okra
Onions
Pea pods
Peppers
Salad greens (lettuce)
Spinach
Summer squash
Tomato/tomato juice
Tomato/vegetable juice
Zucchini

# IMPORTANT SAFETY INFORMATION

## IMPORTANT SAFETY INFORMATION: MINIMED™ 770G SYSTEM WITH SMARTGUARD™ TECHNOLOGY

The MiniMed™ 770G system is intended for continuous delivery of basal insulin (at user selectable rates) and administration of insulin boluses (in user selectable amounts) for the management of type 1 diabetes mellitus in persons two years of age and older requiring insulin as well as for the continuous monitoring and trending of glucose levels in the fluid under the skin. The MiniMed™ 770G System includes SmartGuard™ technology, which can be programmed to automatically adjust delivery of basal insulin based on continuous glucose monitoring (CGM) sensor glucose values (SG) and can suspend delivery of insulin when the SG value falls below or is predicted to fall below predefined threshold values.

The Medtronic MiniMed™ 770G System consists of the following devices: MiniMed™ 770G Insulin Pump, the Guardian™ Link (3) Transmitter, the Guardian™ Sensor (3), one-press serter, the Accu-Chek® Guide Link blood glucose meter, and the Accu-Chek® Guide Test Strips. The system requires a prescription.

The Guardian™ Sensor (3) has not been evaluated and is not intended to be used directly for making therapy adjustments, but rather to provide an indication of when a fingerstick may be required. All therapy adjustments should be based on measurements obtained using a blood glucose meter and not on values provided by the Guardian™ Sensor (3). All therapy adjustments should be based on measurements obtained using the Accu-Chek® Guide Link blood glucose meter and not on values provided by the Guardian™ Sensor (3). Always check the pump display to ensure the glucose result shown agrees with the glucose results shown on the Accu-Chek® Guide Link blood glucose meter. Do not calibrate your CGM device or calculate a bolus using a blood glucose meter result taken from an alternative site. It is not recommended to calibrate your CGM device when sensor or blood glucose values are changing rapidly, e.g., following a meal or physical exercise.

**WARNING: Do not use the SmartGuard™ Auto Mode for people who require less than 8 units or more than 250 units of total daily insulin per day. A total daily dose of at least 8 units, but no more than 250 units, is required to operate in SmartGuard™ Auto Mode.**

**WARNING: Do not use the MiniMed™ 770G system until appropriate training has been received from a healthcare professional. Training is essential to ensure the safe use of the MiniMed™ 770G system.**

Pump therapy is not recommended for people whose vision or hearing does not allow recognition of pump signals and alarms. Pump therapy is not recommended for people who are unwilling or unable to maintain contact with their healthcare professional. The safety of the MiniMed™ 770G system has not been studied in pregnant women. For complete details of the system, including product and important safety information such as indications, contraindications, warnings and precautions associated with system and its components, please consult <http://www.medtronicdiabetes.com/important-safety-information#minimed-770g> and the appropriate user guide at <http://www.medtronicdiabetes.com/download-library>

<sup>1</sup>Battelino T, Danne T, Bergenstal RM, Amiel SA, Beck R, Biester T, Bosi E, Buckingham BA, Cefalu WT, Close KL, Cobelli C. Clinical targets for continuous glucose monitoring data interpretation: recommendations from the international consensus on time in range. *Diab Care*. 2019;1(42):1593–603.







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