

# t:slim<sup>®</sup>

Insulin Pump



touch simplicity<sup>™</sup>



## A Guide to Successful Pumping







# A Guide to Successful Pumping

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# Introduction to Insulin Pump Therapy

## Welcome to insulin pump therapy and a fresh new way to manage your diabetes.

Congratulations on your decision to manage your diabetes with a t:slim® Insulin Pump. To help you better understand insulin pump therapy and achieve the most from your t:slim Pump, we have created this guide. In it, you will find basic information on insulin pump therapy, carbohydrate counting, troubleshooting, physical activity, and other helpful resources to assist you in your daily life.

Starting insulin pump therapy is an exciting time. Chances are, you have questions and concerns. We are here to help you every step of the way.

In this chapter you will:

- Get to know your t:slim Pump.
- Learn basic concepts and expectations of insulin pump therapy.
- Prepare for your upcoming product training session.

*Note: Do not attempt to start insulin pump therapy without the guidance and support of a medical healthcare provider. Your current insulin doses will be used to determine the correct insulin pump dose settings for your individual needs. This Guide is not intended to be a substitute for medical care from your healthcare provider. If you have any questions about your diabetes management, please contact your healthcare provider.*

*Consult the t:slim User Guide for usage, contraindications, warnings and precautions. Should you have concerns about your t:slim Pump, contact Tandem Diabetes Care Customer Technical Support at 1-877-801-6901.*







# Introduction to Insulin Pump Therapy



### Training Tip

Do not load insulin into your t:slim Pump until you have completed your training.

## Preparing for Your t:slim Training

Once you receive your t:slim Pump, a healthcare provider will work with you to make sure you have a good understanding of insulin pump therapy and how to effectively use your t:slim Pump. In addition, your healthcare provider will help you customize insulin pump therapy to your individual needs.

The best way to prepare for your initial training is to work through this guide and get to know your t:slim Pump. Take it out of the box, read through your t:slim Reference Guide, and become familiar with your t:slim Pump.

## Training Session Materials

Listed below are items to bring to your training session:

- Room temperature, rapid-acting insulin (or saline, depending on the need)
- t:slim Pump
- t:slim USB cable
- Pump cartridges (a minimum of three)
- Infusion sets (a minimum of three)
- Infusion site preparation products (antiseptic wipes, skin adhesive, etc.)
- A Guide to Successful Pumping
- t:slim Reference Guide
- Blood glucose testing supplies (meter, strips, lancets, meter batteries)
- Blood glucose records
- Fast-acting glucose tablets and snack
- List of questions and concerns



## Getting to Know Your t:slim Pump – Good Looks Outside. Different Technology Inside.

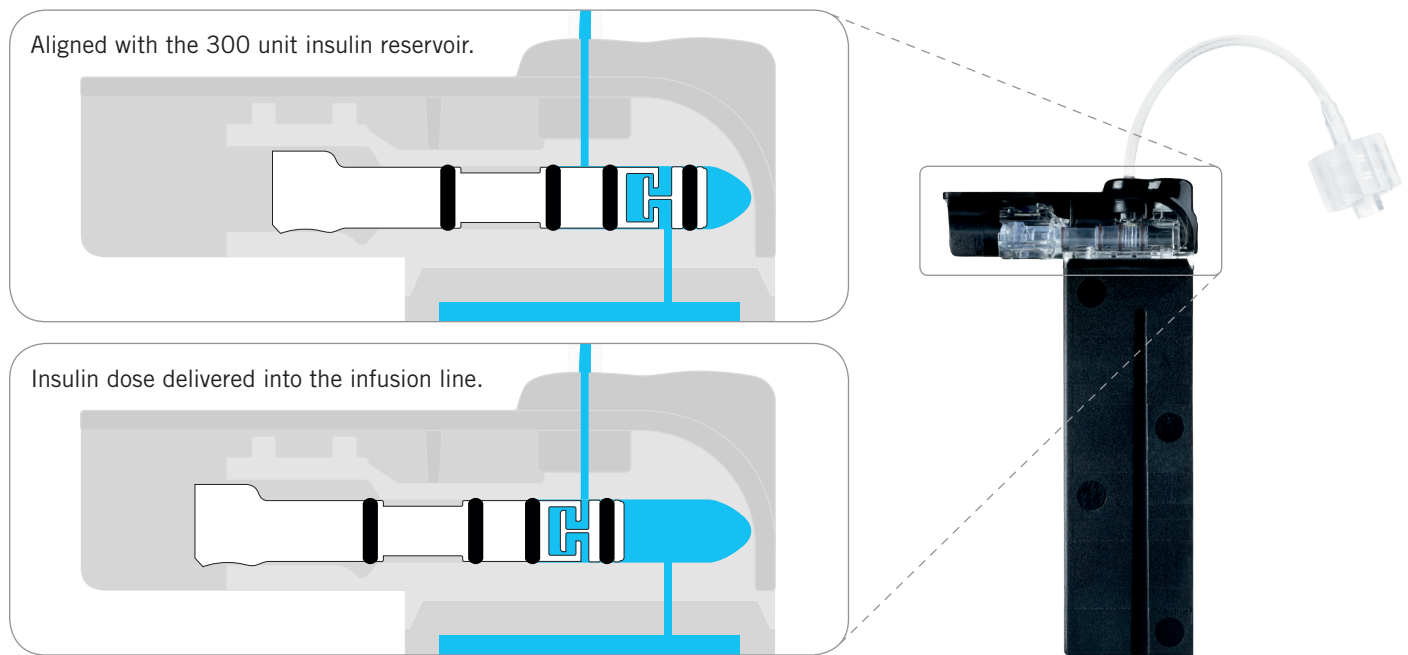
Your t:slim Pump is more than just a pretty face. The technology behind the colorful touch screen offers a wide variety of therapeutic options. But first, let's take a closer look at the hardware and the software that make up your t:slim Pump.

The hardware includes the mechanical “nuts and bolts” of your t:slim Pump. It consists of a tiny motor, a cartridge, and a micro-delivery chamber. Insulin is moved from the cartridge into the micro-delivery chamber, then in very small amounts delivered through a tube and into your body by way of an infusion set.

The software is built into your insulin pump. It is the computer program that tells your t:slim Pump how much insulin to deliver based on your insulin dose settings and the information that you enter.



(t:slim Pump – Actual Size)



Micro-Delivery Chamber Illustration

(t:slim Cartridge – Actual Size)

# Introduction to Insulin Pump Therapy

## Understanding Basic Insulin Pump Therapy Concepts

### Basal Insulin Delivery

Basal insulin, often referred to as “background” insulin, is the slow, continuous delivery of insulin that keeps your blood glucose stable between meals and during sleep. The long-acting insulin that was previously taken by injection is replaced with very small doses of rapid-acting insulin delivered on a continuous basis by your t:slim Pump.

The basal rate represents the amount of rapid-acting insulin delivered over an hour. As an example, a basal rate of 1.0 means that 1 unit of insulin will be divided into equal increments and delivered every 5 minutes over a period of 1 hour.

There are many advantages that insulin pump basal delivery offers over long-acting insulin injections:

- **Basal needs vary from person to person.** Your t:slim Pump can be programmed to release more or less insulin at different times of the day to match your biological needs. For example, if you need more insulin during the early morning, your t:slim Pump can be programmed to increase the amount of insulin delivered at that time. During the afternoon, if less insulin is needed, t:slim can be programmed to deliver a smaller amount.
- **Unexpected changes in your daily routine.** Your basal rate can be modified for unplanned changes; like travel, exercise, a trip to the amusement park, or an illness.

### Bolus Insulin Delivery

A bolus is a quick dose of rapid-acting insulin that is delivered to cover food or an elevated blood glucose. A food bolus is taken every time you eat a meal or snack. The correction bolus is taken to lower or “correct” a high blood glucose.

There are many advantages that an insulin pump bolus offers over insulin injections:

- **You are always covered.** You can take a bolus whenever and wherever, even for those small snacks or the occasional dessert.
- **Your t:slim Pump helps you with your bolus doses.** Just enter the grams of carbohydrate you plan to eat and/or your blood glucose and your t:slim Pump will calculate how much insulin you need. It will even keep track of insulin remaining in your body from previous boluses.

- No more routine daily shots. You do not have to take an injection every time you eat. By simply tapping the screen, you can cover every meal or snack with insulin.
- Fine-tune your boluses. Your t:slim Pump is able to deliver very small amounts of insulin (calculated to the 100th of a unit), making it easier to keep your blood glucose in control. You also have the option of delivering all, or a part of your food bolus over an extended period of time, allowing a better match of insulin for foods that are slower to digest.

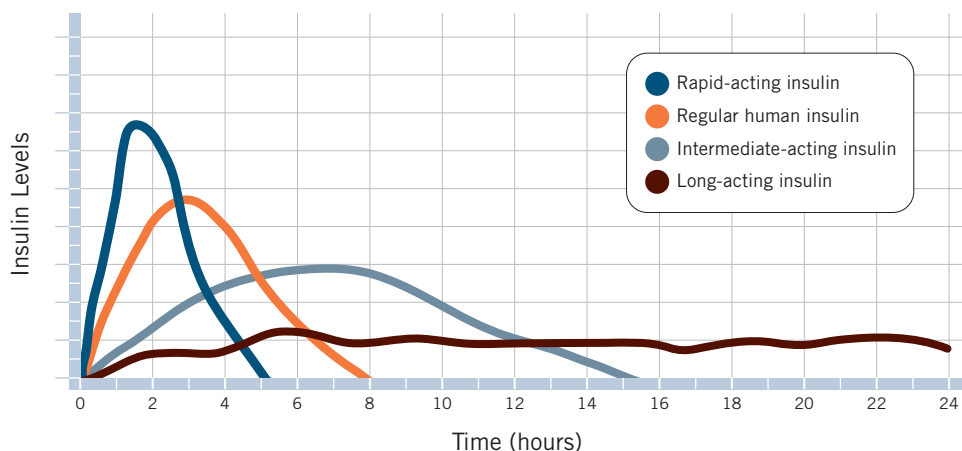
## Rapid-Acting Insulin

Rapid-acting insulin is currently the most similar to the natural insulin that your body produces. It has the most rapid onset of any injectable insulin and works more efficiently at lowering your blood glucose. Though variable, the general characteristics of rapid-acting insulin are:

- Onset – Starts working within 5 to 10 minutes
- Peak – At its strongest within 1 to 1-1/2 hours
- Duration – Clears the body within 3 to 7 hours

The use of rapid-acting insulin as basal insulin offers added flexibility over long-acting insulin. Once long-acting insulin is injected, it remains active in your body from 12 to 24 hours plus. Your t:slim Pump releases rapid-acting insulin for basal coverage continuously, and can be adjusted as needed. See figure below.

## Activity Profiles of Different Insulins



(Adapted from Hirsch, 2005)



### Checkpoint

The slow, steady, continuous delivery of insulin is referred to as:

Answer



### Checkpoint

When is rapid-acting insulin at its peak?

Answer

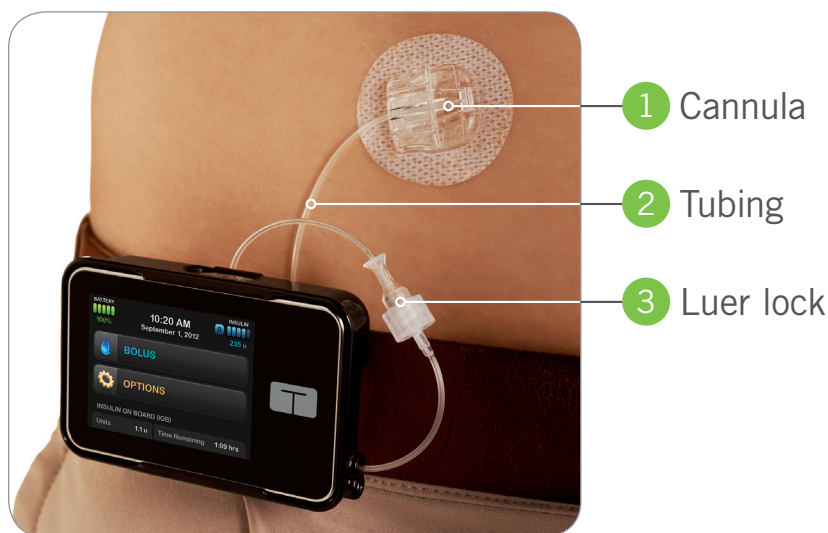


# Introduction to Insulin Pump Therapy

## Learning About Your Insulin Infusion Set and Options

An infusion set consists of a complete tubing system that delivers insulin from your t:slim Pump to you. Your healthcare provider will work with you to show you how to insert your infusion set and discuss how to change it out every 2 to 3 days or sooner, if needed. An infusion set consists of the following:

- 1 The cannula is a very tiny, soft tube or needle placed by you just under your skin to allow insulin to flow into your body.
- 2 The tubing allows insulin to flow from your insulin pump to you.
- 3 The luer lock connects and locks the tubing to your insulin pump.



Tubing is available in a variety of lengths, typically 24, 31, and 42 inches. The length you choose will depend on your height, where you wear your t:slim Pump (inside or outside of your clothing), how you wear your pump when you sleep, and other factors related to your daily activities and preferences.

Your healthcare provider will show you how to insert the cannula into the fatty (subcutaneous) tissue just below the skin surface. The cannula is inserted either manually or with an insertion device via an introducer needle. Once inserted, the introducer needle is removed and the soft, flexible cannula remains under your skin without causing discomfort with movement. A stainless steel needle cannula is another option that some prefer.

Cannula Type	Description	Advantages
Angled	Inserted at a 30 to 45 degree angle. Available in lengths of 13 and 17 mm.	Stable, less risk of accidental removal. Less likely to bump up against muscle in slender people.
90 Degree	Inserted perpendicular to the skin. Available in lengths of 6 and 9 mm.	Easy to insert. Has a shorter cannula.
Stainless Steel	No plastic cannula. The needle remains under the skin. Replaced every 2 days. Though most are 90 degree, can be angled. Available in lengths of 6 and 9 mm.	Frequently used by people with allergies to a plastic cannula. Easy to insert. Does not kink, less risk for occlusion.



### Training Tip

If the infusion site is uncomfortable or if swelling or redness develops, change out your set and notify your healthcare provider. Refer to Chapter 5 for infusion set troubleshooting.

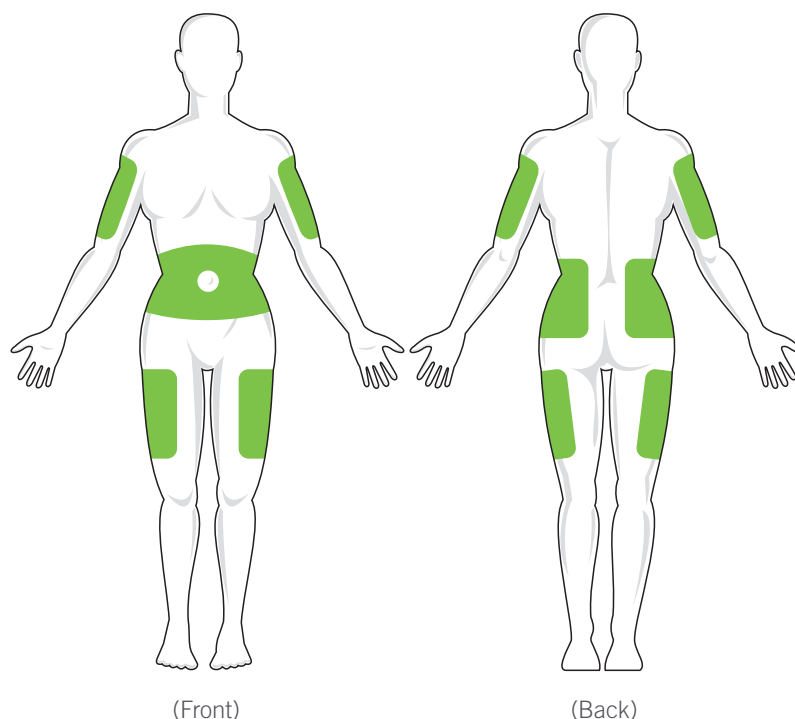
Insertion devices are available to help insert the cannula. These devices are easy to use and a popular option for those who do not want to push the needle in by hand. They are available as a stand-alone insertion device or as part of an all-in-one infusion set. They are typically spring-loaded and are designed to hide the needle from view.

Your healthcare provider will help you determine which infusion set is right for you. Site location preference, your body size, and your activity level will be considered when selecting an infusion set.

## General Guidelines for Infusion Sets

### Site Selection

- Your infusion set can be worn anywhere on your body where you would normally inject insulin. Absorption may vary from site to site. Discuss these options with your healthcare provider.
- The most commonly used sites are the abdomen, upper buttocks, hips, upper arms, and upper legs.



# Introduction to Insulin Pump Therapy



### Checkpoint

How often should the cannula be replaced and the site rotated?

Answer

- The abdomen is the most popular site because of access to fatty tissue. If using the abdominal area, AVOID:
  - » Any area that would constrict the site, such as the belt line, waistline, or where you would normally bend.
  - » Any area 2 inches around your bellybutton.
  - » Always avoid placing the infusion set directly on scars, moles, stretch marks, or tattoos.

### Site Rotation

- The infusion set must be replaced and rotated every 2 to 3 days, or more often if needed.
- With experience, you will find areas that not only provide better absorption, but are more comfortable. Keep in mind, using the same area may cause scarring or lumps, which will affect insulin absorption.
- Establish a rotation schedule that best fits your needs.

### Keep it Clean

- When changing your infusion set, always use clean technique to avoid an infection.
- Wash your hands, use antiseptic wipes or infusion site preparation products, and keep the area clean to avoid contamination.
- Site preparation products that have both an antiseptic and an adhesive are recommended.

### Skin Adhesive (Tape, Dressing, Solution)

- Prevents the infusion set from slipping off or being pulled out if your t:slim Pump is dropped or tugged.
- Useful when engaging in sports or in a hot climate.
- If needed for additional security, create a safety loop by taping the tubing to your skin about 1 to 2 inches from the infusion site.



### Training Tip

A common cause for an occlusion alarm is an infusion set obstruction. The cannula can bend, hit scar tissue, or it may be placed in an area that does not absorb insulin well. When in doubt, change it out! Refer to Chapter 5 for infusion set troubleshooting.



## Setting Realistic Expectations

With insulin pump therapy, it is always helpful to have realistic expectations so you won't be disappointed in your progress. Below are some examples of realistic and unrealistic expectations.

Realistic Expectations	Unrealistic Expectations
Improve my blood glucose management.	Not think about my diabetes anymore.
Monitor my blood glucose more often.	Monitor blood glucose less often.
Keep records and evaluate my progress.	Let my pump do all the work.



Make a list of what you would like to accomplish with insulin pump therapy. Discuss these expectations with your healthcare provider.

*Example: Learn to count carbs and/or reduce my A1C.*

1.

2.

3.

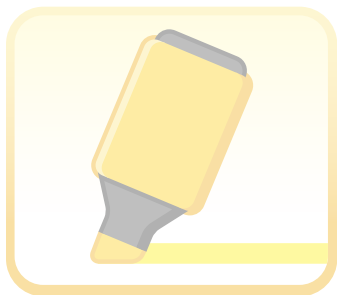
4.

5.

Keep in mind that while insulin pump therapy provides a continual way to deliver insulin, it is not a “cure” for your diabetes. The goal is to manage your blood glucose levels and minimize wide fluctuations. It does not happen overnight. It may take some time to adjust to insulin pump therapy and fine-tune the insulin dose settings that work best for you. Working closely with your healthcare provider will help you along this process.

*Congratulations! You are off to an exciting start!*

# Introduction to Insulin Pump Therapy



### Chapter Highlights

- Be prepared for your t:slim Pump training session by working through this chapter and bringing the necessary items to your session.
- Basal insulin is the continuous, steady release of insulin over a 24-hour period.
- Bolus describes the larger dose of insulin needed to cover food and to correct high blood glucose.
- You will use rapid-acting insulin in your t:slim Pump. Rapid-acting insulin begins working within 5 to 10 minutes, peaks in 1 to 1-1/2 hours, and leaves the body in 3 to 7 hours.
- An infusion set is a complete tubing system that delivers insulin from your t:slim Pump to your body. Work with your healthcare provider to determine which type of infusion set is right for you.
- Establishing realistic expectations for insulin pump therapy in the beginning will help to keep you on track.



## Checkpoint Answers

1. The slow, steady, continuous delivery of insulin is referred to as?

*Answer: Basal insulin.*

2. When is rapid-acting insulin at its peak?

*Answer: 1 to 1½ hours.*

3. How often should the cannula be replaced and the site rotated?

*Answer: Every 2 to 3 days. More frequently, if needed.*



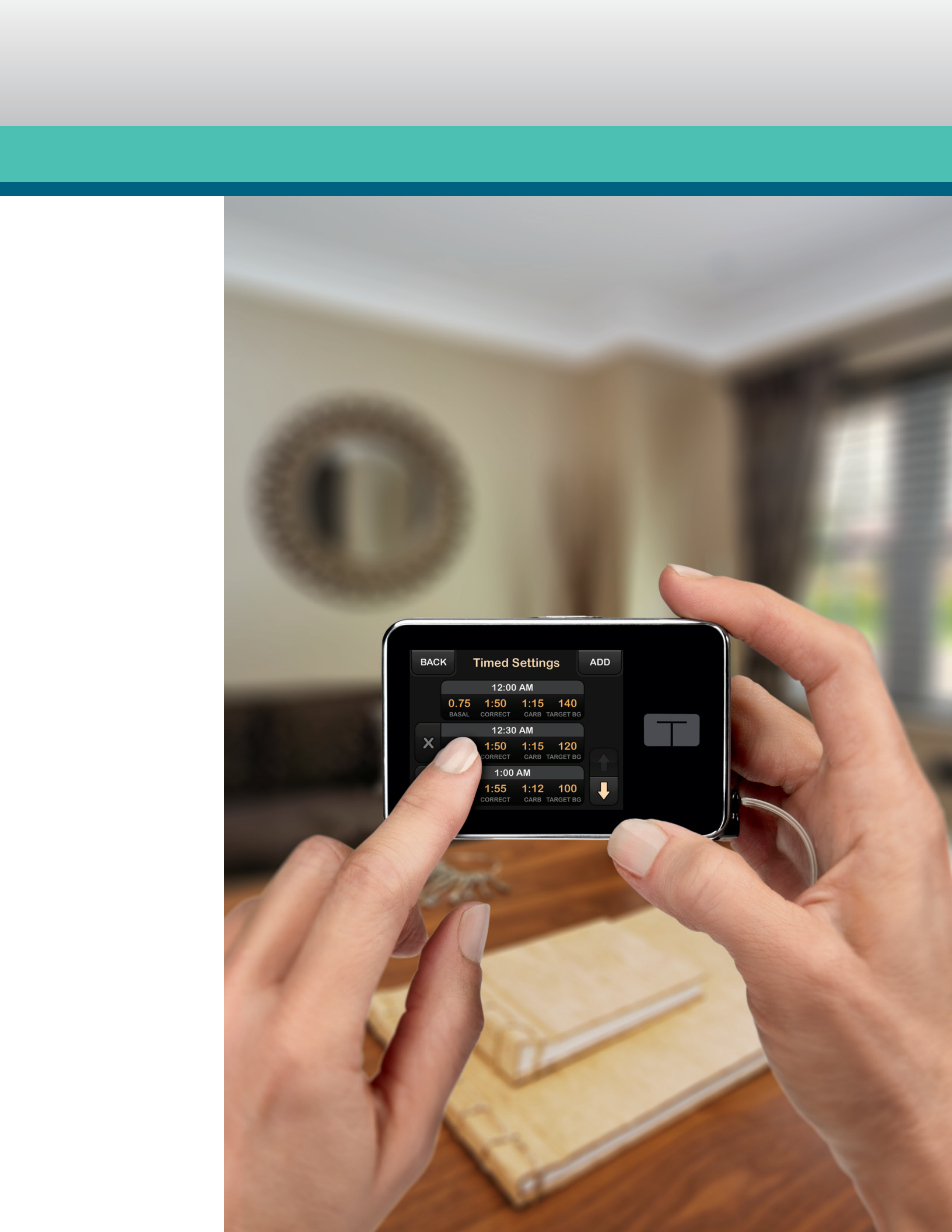
# Customizing Your Insulin Dose Settings

## Programming your insulin pump has never been so easy.

Your t:slim® Pump is so smart its internal software is able to calculate and deliver precise, preprogrammed insulin doses customized specifically for you. To get you started, your healthcare provider will work with you to determine your initial insulin dose settings and help you program them into the Personal Profiles section of your t:slim Pump.

This chapter describes five key insulin dose settings and the role they play in managing your diabetes. They are:

- Basal rate
- Carb ratio (insulin-to-carb ratio)
- Target BG (blood glucose)
- Correction factor (insulin sensitivity)
- Insulin duration (duration of insulin action)



Timed Settings			
12:00 AM			
0.75	1:50	1:15	140
BASAL	CORRECT	CARB	TARGET BG
12:30 AM			
X	1:50	1:15	120
	CORRECT	CARB	TARGET BG
1:00 AM			
	1:55	1:12	100
	CORRECT	CARB	TARGET BG

# Customizing Your Insulin Dose Settings

## Understanding Personal Profiles

Your t:slim Pump makes programming insulin delivery simple. You can easily program several different insulin dose settings on one easy-to-find screen. Once established, these settings are referred to as a Personal Profile.

- A Personal Profile is a group of settings that define your basal and bolus delivery within specific time segments throughout a 24-hour period.
- Within the time segments, a basal rate, correction factor, carb ratio, and target BG (blood glucose) are set.
- Personal Profiles also includes insulin duration, max bolus, and carb settings.

You can program up to six individualized Personal Profiles. Each profile offers customized insulin dose settings (basal rate, correction factor, carb ratio, and target BG) and can be personalized with a name. Programming different Personal Profiles allows you to customize your insulin dosing to handle the following situations:

- Changes in daily activities (routine exercise or sports 3 days per week)
- Regular changes in work schedule (shift work, alternating work schedule)
- Sick days
- Weekends
- Hormonal changes

## Understanding Insulin Dosing Calculations

If you are new to pumping, your healthcare provider will determine your initial insulin dose settings based on your personal history and standard formulas. These formulas are influenced by a variety of clinical factors such as your body weight, blood glucose levels, and your current insulin regimen. Understanding the “math” behind insulin dosing can be overwhelming for some. To help you along, we have provided formulas and activities to ensure that you have a clear understanding of how your t:slim Pump calculates insulin doses.





## Understanding Basal Rate Settings

As presented in Chapter 1, basal insulin is the slow, continuous delivery of insulin that keeps your blood glucose stable between meals and during sleep. When set accurately, the basal rate should keep your blood glucose stable overnight and throughout the day, even if you skip a meal. However, our body's demand for insulin is individualized and may vary throughout a 24-hour period. Your t:slim Pump can be programmed with a basal pattern that is customized to suit these needs.

As you begin insulin pump therapy, it is typical to start with only one or two basal rates over a 24-hour period. Additional basal rates may be added and current basal rates may be changed as you adjust to pump therapy and evaluate your blood glucose control.

The basal rate setting in your t:slim Pump always starts at 12:00 am (midnight). Insulin will be delivered at the first rate until the next time segment is entered and a new rate is started. Below are two examples of basal rate settings.

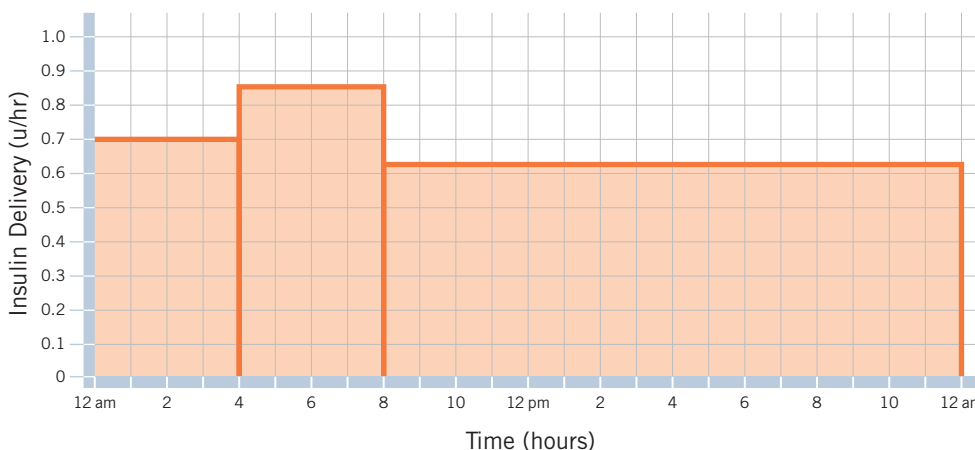
### One Basal Rate:

- From 12 am until 12 am (24 hours), 0.7 units of insulin will be delivered per hour.

### Three Basal Rates:

- From 12 am until 4 am, 0.7 units of insulin will be delivered per hour.
- From 4 am until 8 am, 0.85 units of insulin will be delivered per hour.
- From 8 am until 12 am, 0.62 units of insulin will be delivered per hour.

### Sample Basal Rate Profile Showing Three Basal Rates



# Customizing Your Insulin Dose Settings



It is highly encouraged that you allow your t:slim Pump to calculate boluses by entering the grams of carbohydrate you plan to eat and your current blood glucose.



### Checkpoint

List the two reasons to deliver an insulin bolus.

1) \_\_\_\_\_

2) \_\_\_\_\_

## Calculating Insulin Boluses

Your t:slim Pump is designed to easily and accurately calculate boluses based on the insulin dose setting decided upon by you and your healthcare provider. Simply enter the grams of carbohydrate you plan to eat and/or your current blood glucose reading. Your t:slim Pump will calculate your insulin bolus based on these settings.

### Using a Carb Ratio for a Food Bolus

Carbohydrate converts to glucose immediately causing a sudden rise in blood glucose. For this reason, it is encouraged that you dose insulin before eating carbohydrate foods in order to prevent post-meal hyperglycemia. A food bolus can be taken alone or combined with a correction bolus. Your t:slim Pump will calculate your food bolus based on two factors:

- The amount of carbohydrate you are eating (refer to Chapter 4, Carbohydrate Counting).
- Your carb ratio

The carb ratio is the amount of carbohydrate in grams that 1 unit of insulin will cover. For example, a carb ratio of 1 to 10 (also written 1:10) indicates that 1 unit of insulin is needed for every 10 grams of carbohydrate.

## Standard Formula for Calculating a Food Bolus

$$\frac{\text{Grams of Carb}}{\text{Carb Ratio}} = \text{Food Bolus}$$

Using a carb ratio  
of 1:10

Example:

$$\frac{45}{10} = 4.5 \text{ units}$$


$$\frac{60 \text{ grams}}{15} = \boxed{\phantom{000}} \text{ (Food Bolus)}$$

### Boluses Calculated for 30 Grams of Carbohydrate

As you can see, the amount of insulin that would be delivered as a bolus can vary quite a bit. This would have an effect on your post-meal blood glucose, especially with larger and more frequent meals.

The target BG setting in your t:slim Pump is a specific blood glucose goal used to calculate a correction bolus. When a blood glucose value is entered into your t:slim Pump, the insulin bolus will be adjusted up or down as needed to attain your target. By using a target, your t:slim Pump is able to “zero in” with precision to help reach your blood glucose goal.

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# Customizing Your Insulin Dose Settings



### Checkpoint

What setting reflects the amount of blood glucose (in mg/dL) that is lowered by 1 unit of insulin?

Answer

### Calculating a Correction Bolus

When your blood glucose is not at target, your t:slim Pump will calculate the amount of insulin needed to reach your target blood glucose. It does this by using a correction factor, sometimes referred to as a sensitivity factor, to calculate a correction bolus. Your t:slim Pump will use the following to calculate the correction bolus:

- Current blood glucose
- Target BG (blood glucose)
- Correction factor
- Insulin on board (IOB and Insulin Duration discussed later in this chapter)

The correction factor reflects the amount of blood glucose (in mg/dL) that is lowered by 1 unit of insulin. For example, a correction factor of 1:50 indicates 1 unit of insulin will lower your blood glucose 50 mg/dL.

## Standard Formula for Calculating a Correction Bolus

$$\frac{\text{Current BG (mg/dL)} - \text{target BG (mg/dL)}}{\text{Correction Factor}} = \text{Correction Bolus}$$

Using a correction factor of 1:50 and target BG of 100 mg/dL

### Example 1

If your BG is above target

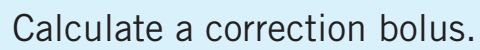
$$\frac{(220 - 100)}{50} = 2.4 \text{ units}$$

### Example 2

If your BG is below target

$$\frac{(80 - 100)}{50} = -0.4 \text{ units}$$

no bolus is suggested


$$\frac{200 \text{ mg/dL} - 100 \text{ mg/dL}}{50 \text{ (correction factor)}} = \text{[ ]}$$

(Correction Bolus)

[illegible]



# Customizing Your Insulin Dose Settings



### Checkpoint

The amount of insulin remaining in your body from previous boluses that will continue to lower your blood glucose is referred to as

Answer

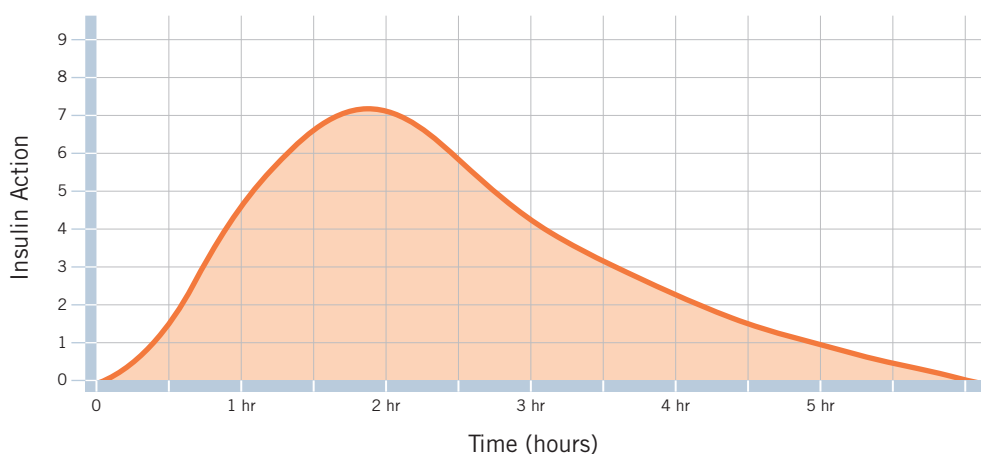
### Understanding Insulin Duration (Duration of Insulin Action)

Your t:slim Pump remembers how much insulin is remaining from previous food or correction boluses. It does this by relying on the insulin duration setting when calculating a correction bolus. The insulin duration reflects the amount of time an insulin bolus is actively lowering your blood glucose.

While the insulin duration reflects the amount of time insulin lowers your blood glucose, the insulin on board (IOB) (displayed on your home screen) reflects how much insulin is remaining in your body from previous boluses that will continue to lower your blood glucose. This is sometimes referred to as “active insulin.” The insulin duration setting is needed to calculate IOB. It does not include any basal insulin, only insulin delivered as a food or correction bolus.

The graph below demonstrates the insulin duration of rapid-acting insulin and how it is not equally distributed over time. It is most active 1 to 3 hours following a bolus, however it may continue to actively lower your blood glucose up to 7 hours once it is delivered. This directly influences the bolus calculation.

### Duration of Insulin Action



(Adapted from Walsh, 2012)

For example, if the insulin duration in your t:slim Pump is set for 5 hours, 3 hours after a food or correction bolus your IOB would reflect 2 hours of insulin remaining on board (in your body). This means that your blood glucose could continue to drop over the next 2 hours. Your t:slim Pump would reduce the recommended bolus to prevent “insulin stacking” which could lead to hypoglycemia.

## Standard Formula Using IOB to Calculate a Bolus

1) Begin with a Correction Calculation

$$\frac{\text{Current BG (mg/dL)} - \text{target BG (mg/dL)}}{\text{Correction Factor}} = \text{Correction Bolus}$$

2) Next, Subtract the IOB

$$\text{Correction Bolus} - \text{IOB (Insulin on Board)} = \text{Calculated Bolus}$$

Using a current BG of 200 mg/dL,  
a correction factor of 1:50,  
a target BG of 100 mg/dL,  
and 0.8 units of IOB remaining

Example:

$$\frac{(200 - 100)}{50} = 2.0 \text{ units}$$

$$\begin{array}{r} 2.0 \text{ units} \\ - 0.8 \text{ units} \\ \hline 1.2 \text{ units} \end{array}$$

### Pitfalls to an Inaccurate Insulin Duration Setting

Insulin Duration Set Too Short	Insulin Duration Set Too Long
<ul style="list-style-type: none"><li>• Hides true IOB</li><li>• Leads to insulin stacking</li><li>• Increases risk of hypoglycemia</li><li>• Leads to incorrect adjustments to basal rate, carb ratio, and correction factor</li></ul>	<ul style="list-style-type: none"><li>• Hides true IOB</li><li>• Leads to inadequate correction dose</li><li>• Increases risk of hyperglycemia</li><li>• Leads to incorrect adjustments to basal rate, carb ratio, and correction factor</li></ul>

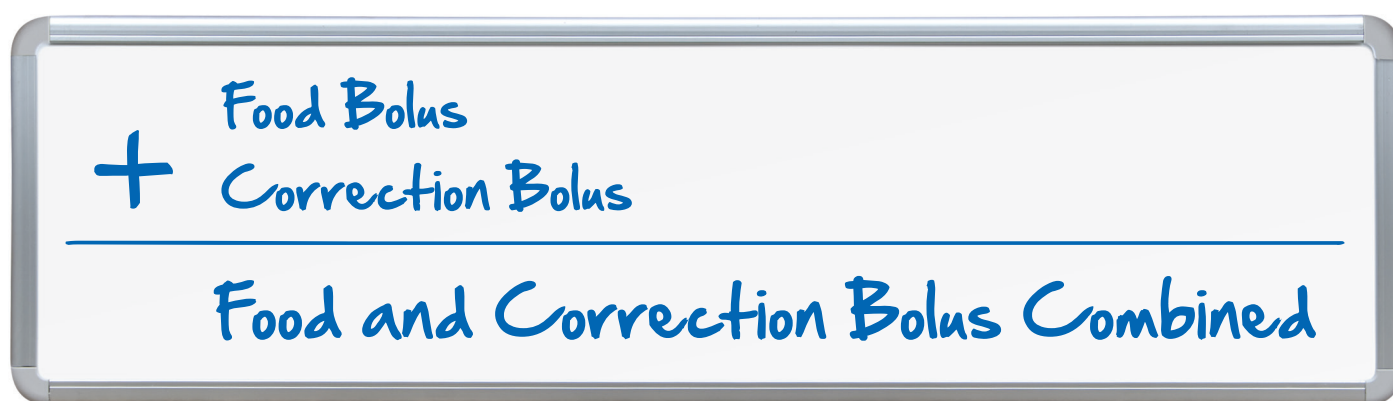
An accurate insulin duration setting prevents insulin stacking, improves bolus accuracy, and reveals current carbohydrate or insulin deficit.

*Note: While insulin duration can be influenced by immediate factors including activity, exercise, and hot weather, it is not recommended to change the insulin duration as a temporary measure.*

# Customizing Your Insulin Dose Settings

## Putting It All Together: Calculating a Bolus

Now that you have a better understanding of the key insulin dose settings, let's put it all together to see how your carb ratio, correction factor, target BG, and insulin duration are used to calculate a bolus.



### Food Bolus

When grams of carbohydrate are entered, your t:slim Pump will use your carb ratio to calculate the amount of insulin needed for a food bolus.

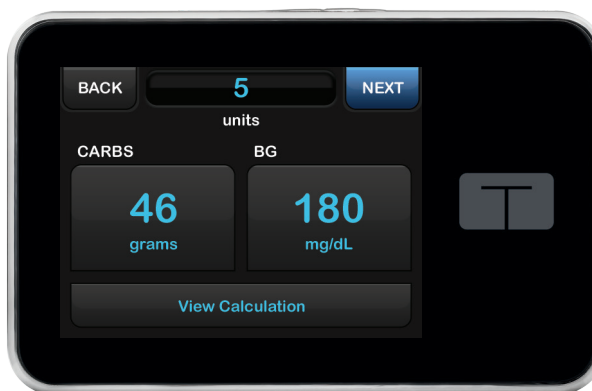
### Correction Bolus

When your blood glucose is above your target BG – Your t:slim Pump will use your correction factor to calculate the amount of insulin needed to reach your target BG. If IOB is present, it will be used in the calculation of the bolus.

When your blood glucose is below your target BG – Your t:slim Pump will display a message advising you to eat carbs and retest BG.

### Food and Correction Bolus Combined

When your blood glucose is above your target BG – The insulin for the food bolus and the correction bolus will be added together. If IOB is present, it will only be used in the calculation of the correction portion of the bolus.



When your blood glucose is between 70 mg/dL and your target BG – You will be given an option to reduce the food bolus to correct for the low blood glucose. In addition, if IOB is present, it will also be used to reduce the bolus calculation.

When your blood glucose is below 70 mg/dL – The food bolus will be reduced to correct for the low blood glucose. In addition, if IOB is present, it will be used in the calculation of the food bolus in order to return your BG to target.

With your t:slim Pump, you don't have to calculate a dose, track active insulin, or inject insulin every time you eat or when your blood glucose is high. Now, just enter your blood glucose and/or the grams of carbohydrate you plan to eat and your t:slim Pump will calculate the insulin you need.

## Actively Managing Your Insulin Dosing

Keep in mind that your t:slim Pump is only as smart as the information that is provided to it. Only you know if your blood glucose is trending up or down, if you are planning to exercise, if you are sick, or of other life influences that may affect your blood glucose. Minor adjustments to your bolus may be needed for these occurrences. Remember to periodically evaluate and fine-tune your insulin dose settings and always discuss any adjustments to these setting with your healthcare provider.



Do you know your t:slim Pump dose settings?

Basal Rate(s):

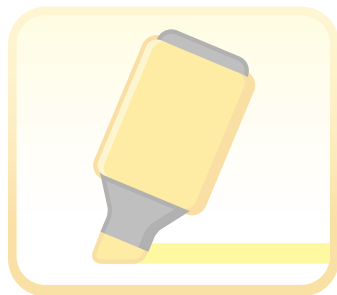
Correction Factor:

Carb Ratio:

Target BG:

Insulin Duration:

# Customizing Your Insulin Dose Settings



## Chapter Highlights

- Your healthcare provider will help you calculate and program the following five insulin dose settings into your t:slim Pump.
  1. Basal rate – a steady, continuous release of insulin.
  2. Correction factor – the amount of blood glucose lowered by 1 unit of insulin.
  3. Carb ratio – the amount of carbohydrate (in grams) that 1 unit of insulin will cover.
  4. Target BG – a specific blood glucose goal used to calculate a correction dose.
  5. Insulin duration – the amount of time insulin will actively lower your blood glucose.
- Insulin on board (IOB) is the amount of insulin remaining in your body from previous boluses.
- Insulin stacking occurs when previous boluses are active while a new bolus is being delivered. Your t:slim Pump tracks IOB to help prevent hypoglycemia.





## Checkpoint Answers

1. List the two reasons to deliver an insulin bolus.

*Answer: Food and correction*

2. What setting reflects the amount of blood glucose (in mg/dL) that is lowered by 1 unit of insulin?

*Answer: Correction factor*

3. The amount of insulin remaining in your body from previous boluses that will continue to lower your blood glucose is referred to as?

*Answer: Insulin on board (IOB).*



## Activity Answer Key – Calculate a Correction Bolus

1. Calculate a Food Bolus.

$$\frac{60 \text{ grams}}{15} = \boxed{\phantom{000}} \text{ (Food Bolus)}$$

*Answer: 4 units*

2. Calculate a Correction Bolus.

$$\frac{200 \text{ mg/dL} - 100 \text{ mg/dL}}{50 \text{ (correction factor)}} = \boxed{\phantom{000}} \text{ (Correction Bolus)}$$

*Answer: 2 units*

# Managing Your Daily Diabetes Tasks

Establishing good daily habits will keep you on track for success.

As someone with diabetes, you know there are particular daily tasks to help you best manage your diabetes. With time, and as you become more experienced with insulin pump therapy, you will likely feel that managing diabetes becomes easier compared to when you took injections.

This chapter focuses on the tools for daily diabetes management that can make the results of your efforts as good as possible.

- Daily pumping tasks
- Record keeping
- Supplies to carry and keep at home



# Managing Your Daily Diabetes Tasks



### Training Tip

Continuous Glucose Monitoring (CGM) uses a sensor that is inserted under the skin surface to continually read glucose values. Though not a replacement for traditional blood glucose monitoring, CGM can provide useful information about glucose trends. Talk to your healthcare provider to find out more about CGM.

## Managing Your Daily Pumping Tasks

What you do on a day-to-day basis will play a role in the success of your insulin pump therapy and the management of your diabetes. The following daily tasks will help you achieve the best results.

### Monitor your Blood Glucose

Research shows that the more you monitor your blood glucose, the better your control will be (Exp Clin Endocrinol Diabetes. 2006; p384–388).

- At least four blood glucose checks every day are recommended.
- Additional monitoring may be needed for troubleshooting high or low blood glucose and to evaluate your insulin dose settings.
- If you are new to insulin pumping, you may need to do more.
- Continuous glucose monitoring (CGM) allows you to see more glucose values and trends than blood glucose monitoring alone.

### Check Your Infusion Set and Site

Make sure your infusion site is problem-free.

- If there is any discomfort, redness, swelling, or discharge, change your infusion set and site. You may need to contact your healthcare provider.
- Inspect the tubing for air. If you see bubbles or an air space, disconnect the tubing from your body and clear the air out by performing the Fill Tubing step through the Load menu. Always disconnect the tubing from your body while performing any step in the Load process. Refer to your *t:slim User Guide* for help.

### Check Your t:slim Pump

Make it a daily habit to review your settings. For instance:

- Are the date and time correct?
- Is the Personal Profile you expect to be running, actually running?
- Have there been any recent alerts or alarms?
- Do you have plenty of insulin in the cartridge?
- Is there enough battery charge to get through the day?



## Keep Records

Keeping logs, in one form or another, will help you to keep track of what works and what doesn't. Read on to learn more about record keeping in this chapter.

## Carry What You Need

When pumping insulin, you still need to carry important diabetes supplies every day. A list of supplies will be provided in this chapter.

## Evaluate the Foods You Are Eating

Count the grams of carbohydrate in your food and think about other aspects of your food that might have an impact on your blood glucose. Refer to Chapter 4 for information about carbohydrate counting.



### Checkpoint

List at least three daily tasks that will help you get the most out of insulin pump therapy.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_





# Managing Your Daily Diabetes Tasks

## Keeping Records

While keeping blood glucose records can be a challenge, it is one of your most important daily tasks and a key tool in managing your blood glucose. Everyone is unique. Keeping daily records of your blood glucose and how it is impacted by what you eat, your work schedule, and other factors, can help you be as precise as possible with your insulin dosing.

Eventually, you may find that keeping detailed daily records will help motivate you toward healthier behavior, which in turn will motivate you to keep up with your record keeping. If you are having a difficult time staying motivated, please refer to Appendix D for a list of helpful resources.

Listed below are a variety of record keeping methods to help keep you on track.

- **Log-books (paper and electronic)** – Some healthcare providers prefer log booklets with manual entries. They are easy-to-access and the formatting is consistent. Many allow free text entries which make the information invaluable when looking at your corresponding blood glucose.
- **Meter downloads** – Downloading blood glucose logs from your meter is another option. While this can be easy, keep in mind that some pertinent data may not be there; for example, specific foods eaten, insulin dosing, and activities.
- **CGM downloads** – Continuous glucose monitors provide software for downloading blood glucose values and other events that you enter into your CGM. Again, like meter downloads, some pertinent data may not be there.

- **Smart phone applications or PDA's** – Applications for smart phones allow you to enter blood glucose values, insulin dosing, food, activities, as well as free text notes.
- **t:connect® Application reports** – Your t:slim Pump offers software that lets you download your data and create easy-to-understand reports. The blood glucose readings that you enter into your t:slim Pump will be included and you can also enter free text notes, so everything is all in one place.



t:connect® Application Dashboard



From the list below, select each item that has influenced your blood glucose in the past.

- |   |   |
|---|---|
| <input type="checkbox"/> Food: Carbohydrate counting error                                    | <input type="checkbox"/> Medications                |
| <input type="checkbox"/> Food: Carbohydrate counting accurate, but question glycemic response | <input type="checkbox"/> Exercise/physical activity |
| <input type="checkbox"/> Insulin dose too high or too low                                     | <input type="checkbox"/> Travel: Drives or flights  |
| <input type="checkbox"/> Timing of insulin  | <input type="checkbox"/> Travel: Time zone change   |
| <input type="checkbox"/> Stress   | <input type="checkbox"/> Changing work schedule     |
| <input type="checkbox"/> Illness  | <input type="checkbox"/> Denatured (bad) insulin    |
| <input type="checkbox"/> Infection  | <input type="checkbox"/> Alcohol                    |
| <input type="checkbox"/> Period following high or low blood glucose event                     | <input type="checkbox"/> Other influences: _____    |
| <input type="checkbox"/> Hormonal changes   | _____   |
|   | _____   |

Did you check all or most of them? Were there additional items to add? Considering these influences will be very useful as you work through blood glucose pattern management.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_






# Managing Your Daily Diabetes Tasks

## Supplies to Carry and to Keep at Home

When pumping insulin, you will still need to carry almost everything you did before plus a few new things. It is best to have a kit that you keep in the same, handy place so you will never be without your supplies. In addition to the supplies you carry every day, be prepared with extra supplies for home and when traveling. Keep in mind that insulin pump supplies require a prescription and usually cannot be purchased at retail stores or local pharmacies.

### Supplies to Carry Every Day:

- Blood glucose testing supplies: meter, strips, lancets, meter batteries
- Fast-acting carbohydrate for low blood glucose
- Extra snack for longer coverage than fast-acting carbohydrate
- Glucagon emergency kit (for recurrent, severe hypoglycemia)
  - Rapid-acting insulin and syringes
  - Infusion sets (a minimum of two)
  - Insulin pump cartridges (a minimum of two)
  - Infusion site preparation products (antiseptic wipes, skin adhesive)
  - Ketone testing strips
  - t:slim Wallet Card (for troubleshooting tips and your t:slim Pump dose settings)
  - Diabetes identification card or jewelry
  - t:slim Pump USB cable

	<b>TANDEM™</b> DIABETES CARE	DATE _____
	NAME _____	
	HEALTHCARE PROVIDER _____	( ) - PHONE _____
	PHARMACY _____	( ) - PHONE _____
If technical assistance is needed contact Tandem Diabetes Care Technical Support		 1-877-801-6901

(t:slim Emergency Wallet Card)

### Supplies to Keep at Home:

- Blood glucose testing supplies: meter, strips, lancets, meter batteries
- Fast-acting carbohydrate for low blood glucose
- Extra snack for longer coverage than fast-acting carbohydrate
- Glucagon emergency kit (for recurrent, severe hypoglycemia)
- Rapid-acting insulin and syringes
- At least one full box of infusion sets and cartridges
- Infusion site preparation products (antiseptic wipes, skin adhesive)
- Ketone testing strips
- Long-acting insulin, or a prescription in case you need to be without your t:slim Pump for a period of time.
- A written plan describing how to cover yourself with injections if you need to be without your t:slim Pump for a period of time. Discuss a back-up plan with your healthcare provider.
- t:slim Pump USB cable

### Supplies to Carry When Traveling:

Take your usual every day carry kit

- Estimate how many cartridges and infusion sets you will need; take two to three times this amount.
- Additional rapid-acting insulin and a prescription
- Long-acting insulin, or a prescription
- A written plan describing how to cover yourself with injections if you need to be without your t:slim Pump for a period of time. Discuss a back-up plan with your healthcare provider.
- t:slim Pump USB cable



### Checkpoint

What supplies are best to carry in your everyday kit?

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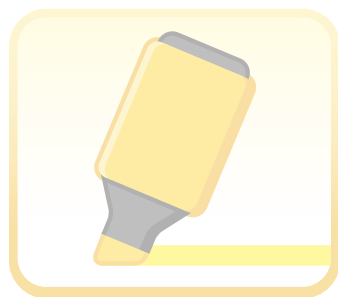
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*Answer*

# Managing Your Daily Diabetes Tasks



### Chapter Highlights

- Practicing a daily diabetes management routine is critical for positive outcomes with insulin pump therapy.
- For the best results, monitor your blood glucose a minimum of 4 times per day, preferably more.
- Establish a good record keeping system to evaluate what you do on a day-to-day basis and to share with your healthcare provider.
- Be prepared and carry the following supplies for daily use: blood glucose testing supplies, fast-acting carbohydrate, extra snack, glucagon emergency kit, rapid-acting insulin and syringes, infusion sets, extra cartridges, infusion site preparation products, ketone testing strips, t:slim Wallet Card, diabetes identification, t:slim Pump USB cable.
- Ensure that you have the following items at home: blood glucose testing supplies, fast-acting carbohydrate, extra snack, glucagon emergency kit, rapid-acting insulin and syringes, full box of infusion sets and insulin cartridges, infusion site preparation products, ketone testing strips, long-acting insulin or prescription, back-up plan, t:slim Pump USB cable.
- When traveling, plan ahead and carry the following: every day kit, extra infusion sets and insulin cartridges, additional rapid-acting insulin, long-acting insulin or prescription, back-up plan, t:slim Pump USB cable.





## Checkpoint Answers

1. List at least three daily tasks that will help you get the most out of insulin pump therapy.

*Answer:*

- *Monitor your blood glucose frequently*
- *Check your infusion site and set*
- *Check your t:slim Pump*
- *Keep detailed records*
- *Carry diabetes management supplies*
- *Evaluate the impact of the foods you are eating*

2. What supplies are best to carry in your everyday kit?

*Answer:*

- *Blood glucose testing supplies*
- *Fast-acting carbohydrate*
- *Extra snack*
- *Glucagon emergency kit*
- *Rapid-acting insulin and syringes*
- *Infusion sets*
- *Insulin pump cartridges*
- *Infusion site preparation products*
- *Ketone testing strips*
- *t:slim Wallet Card*
- *Diabetes identification card or jewelry*
- *t:slim Pump USB cable*

# Understanding Carbohydrate Counting

Developing a healthy relationship between carbohydrate counting and insulin dosing is a powerful tool for success.

Managing your diabetes involves a variety of tools and techniques to keep you in check. As you know, food has a big effect on your blood glucose. Carbohydrate counting offers the flexibility of matching your insulin to the carbohydrate foods that you eat.

This chapter will help you gain a better understanding of carbohydrate counting and includes the following:

- Tools for identifying carbohydrate and estimating the amount of carbohydrate in food.
- Reading and understanding nutrition food labels.
- Learning about factors that may have an impact on your blood glucose and insulin dosing.



# Understanding Carbohydrate Counting



### Training Tip

Carbohydrates are sugars and starches that the body breaks down into glucose and uses as an energy source.

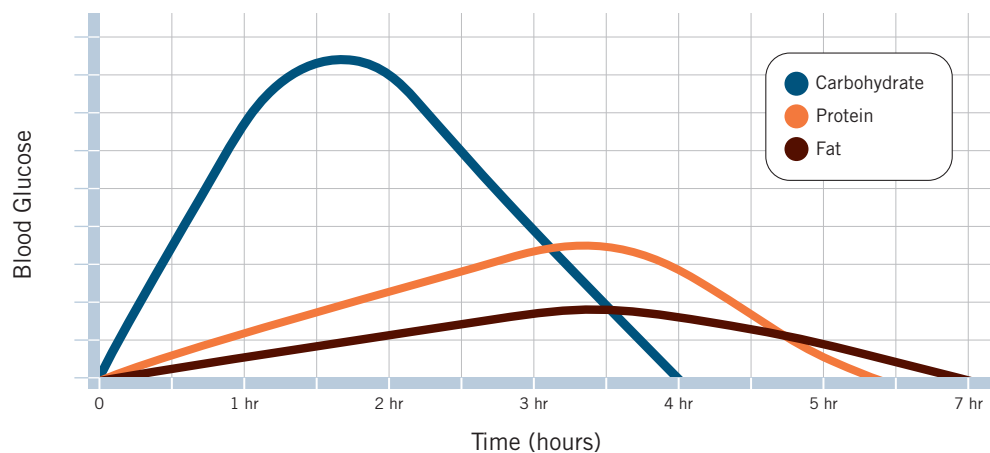
## Understanding Carbohydrate Counting: The Basics

Carbohydrate counting is an effective meal planning approach for managing your blood glucose. In simple terms, it is a method for estimating the carbohydrate content in food. It is not a “diet,” but a way of balancing the carbohydrate you eat with your insulin dose. Understanding carbohydrate counting will give you more flexibility with your food and lifestyle choices.

Calories from food derive from three nutrients: fat, protein, and carbohydrate. Each nutrient affects blood glucose differently, however, carbohydrate has the greatest impact on blood glucose.

Within minutes of eating carbohydrate, blood glucose levels start to rise. After 1 to 2 hours, most of the carbohydrate has been converted into blood glucose. Insulin must be available in your blood to carry glucose into the cells.

### Effects of Nutrients on Blood Glucose Over Time



(Adapted from Whitney, 2012)

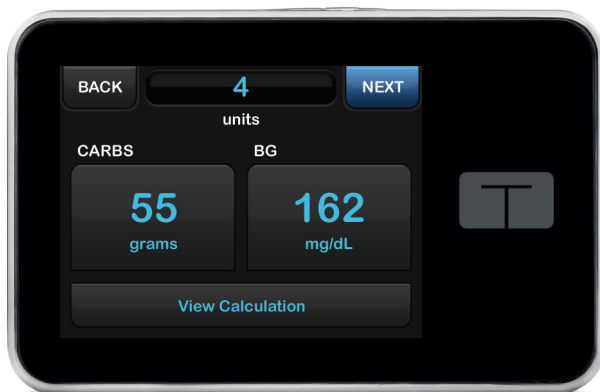
## Carbohydrate Counting and Insulin Pump Therapy – A Dynamic Duo

The amount of carbohydrate that you enter into your t:slim Pump at each meal and snack will determine how much insulin will be calculated and delivered as a food bolus. Carbohydrate counting combined with insulin pump therapy offers more flexibility by:

- Matching insulin more precisely with carbohydrate.
- Allowing more flexibility with food choices.
- Allowing more flexibility with meal timing.

Entering carbohydrate grams into your t:slim Pump is just a few taps away, however estimating the amount of carbohydrate in your food may prove to be more of a challenge. Keep in mind, carbohydrate counting is not an exact science. It is a system that uses a variety of tools and techniques to help you make an educated guess. To effectively count carbohydrate, there are three questions to help guide you. They are:

1. What foods contain carbohydrate?
2. How much food am I eating?
3. How much total carbohydrate am I eating?



### Checkpoint

Of the three major nutrients, carbohydrate, protein, and fat, which has the greatest impact on your blood glucose?

Answer

# Understanding Carbohydrate Counting



### “What Foods Contain Carbohydrate?”

Almost everything contains carbohydrate! Below is a short list of common foods that contain carbohydrate:

- Grains: bread, cereal, rice, pasta
- Starchy vegetables: potatoes, corn, peas, beans
- Non-starchy vegetables contain a small amount of carbohydrate
- Fruit and fruit juice
- Milk and milk products
- Desserts and other sweets



Where's the carbohydrate? Check all foods below that contain carbohydrate.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Bread                | <input type="checkbox"/> Hot Dogs             | <input type="checkbox"/> Fat-free Hot Dogs  |
| <input type="checkbox"/> Cheese               | <input type="checkbox"/> Whole Milk           | <input type="checkbox"/> Beans              |
| <input type="checkbox"/> Tofu                 | <input type="checkbox"/> Fat-Free Milk        | <input type="checkbox"/> Soy Sauce          |
| <input type="checkbox"/> Shrimp               | <input type="checkbox"/> Spinach              | <input type="checkbox"/> Pizza              |
| <input type="checkbox"/> Apples               | <input type="checkbox"/> Potatoes             | <input type="checkbox"/> Mustard            |
| <input type="checkbox"/> Sugar                | <input type="checkbox"/> Tortillas            | <input type="checkbox"/> French Fries       |
| <input type="checkbox"/> Steak                | <input type="checkbox"/> Eggs                 | <input type="checkbox"/> Light Beer         |
| <input type="checkbox"/> Pasta                | <input type="checkbox"/> Yogurt               | <input type="checkbox"/> Mayonnaise         |
| <input type="checkbox"/> Rice                 | <input type="checkbox"/> Sugar-Free Pudding   | <input type="checkbox"/> Ice Cream          |
| <input type="checkbox"/> Beer                 | <input type="checkbox"/> Coleslaw             | <input type="checkbox"/> Peanut Butter      |
| <input type="checkbox"/> Barbecue Ribs        | <input type="checkbox"/> Fish                 | <input type="checkbox"/> Sugar-Free Cookies |
| <input type="checkbox"/> Ranch Salad Dressing | <input type="checkbox"/> Marinara Pasta Sauce | <input type="checkbox"/> Chicken Fingers    |
| <input type="checkbox"/> Sugar-Free Gelatin   | <input type="checkbox"/> Sliced Turkey        | <input type="checkbox"/> Ketchup            |



## “How Much Food Am I Eating?”

The amount of carbohydrate that you eat will affect the amount of insulin you need. It is easy to under or over estimate the amount of food you are eating. Even a small miscalculation entry can affect the amount of insulin your t:slim Pump will calculate for a bolus. Weighing and measuring the food you eat can help keep your carbohydrate counting accurate. This, in turn results in better blood glucose control.

It is not necessary or practical to weigh and measure your food every time you eat. The practices and techniques in this chapter will help to “train your eye.” The more you practice, the better you will be able to estimate carbohydrate when it is not practical to measure, for example, when dining out.

### Here Are Some Helpful Tips for Weighing and Measuring Foods:

- Use a dry measuring cup for measuring solid foods. The food should be level with the top of the cup.
- Use a liquid measuring cup for measuring liquids. The liquid should be at eye level with the top of the cup.
- Use a kitchen scale for food that will not easily fit into measuring cups, like whole fruit or bread.



### Training Tip

The amount of carbohydrate that you need varies from person to person. Speak with your healthcare provider for specific recommendations.





# Understanding Carbohydrate Counting



### Training Tip

Officially recognized sites, groups, and associations are formally acknowledged as maintaining a certain set of standards in the industry. Beware of sites or groups that are not credible and the primary goal is to sell a product. Though some of these may be valid, ensure that one or more of the following criteria are met.

1. Reviewed or updated at least every 5 years.
2. The medical content is supported with reputable references.
3. If the article or website is written by an individual, credentials should be listed.

## “How Much Total Carbohydrate Am I Eating?”

### Carbohydrate Counting Resources

Countless resources are available to help us estimate carbohydrate in food. Some options are listed below.

- **Printed Materials** in the form of books, booklets, cookbooks, and handouts have become increasingly popular. Look for officially recognized publications for the most accurate and reliable information. Cookbooks and recipes with nutrient breakdown are recommended.
- **Online Resources** are available in a variety of formats. Again, look for officially recognized sites.
- **Software Applications** for carbohydrate counting are easily downloaded onto your computer, PDA, and/or smart phone. Many are offered with printed material or a resource book.
- **Restaurants and Fast-Food chains** are now offering nutrition information for the health conscious eater. This information can be found at the restaurant or online.

See Appendix D for a list of carbohydrate counting resources.



## Nutrition Facts Labels

The Nutrition Facts label, regulated by the U.S. Food and Drug Administration (FDA), is the most reliable and easy-to-use resource for estimating carbohydrate in foods. The two most important and useful carbohydrate counting items on the label are the Serving Size and the Total Carbohydrate (grams).

Nutrition Facts	
Serving Size 1/2 a cup (114g)	
Servings Per Container 4	
Amount Per Serving	
Calories: 90	Calories from Fat 30
% Daily Value*	
Total Fat: 3g	5%
Saturated Fat: 0g	0%
Cholesterol 0mg	0%
Sodium 300mg	13%
Total Carbohydrate 13g	4%
Dietary Fiber 3g	12%
Sugars 3g	
Protein 3g	
Vitamin A 80%	• Vitamin C 60%
Calcium 4%	• Iron 4%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.	

### Serving Size

Always check the Serving Size first. It is not a suggested serving but a reference for all of the information on the label. It is based on one serving.

The Serving Size listed may be different than the amount you are eating.

### Total Carbohydrate

Keep your focus on Total Carbohydrate or Total Carbs (g represents grams), not Sugars below. This reflects all carbohydrate including sugar, starch, fiber, other, and sugar alcohol.

### Example

In this example, 1/2 cup of this product contains 13 grams of carbohydrate.

Let's consider a different serving amount:

if 1/2 cup = 13 grams  
then 1 cup = 26 grams  
and 1/4 cup = 6 1/2 grams



### Checkpoint

What two items on the Nutrition Facts Label are most helpful when counting carbohydrate?

1) \_\_\_\_\_

2) \_\_\_\_\_

The Sugar listing under Total Carbohydrate is very misleading. All carbohydrate (sugar and starch) is included as "Total Carbohydrate." Focusing on sugar alone reveals only a small part of the picture.

Do not confuse the gram weight of the food item (to the right of Serving Size on label) with grams of Total Carbohydrate. In this example, the gram weight of 114 g represents how much 1/2 cup of this food weighs.



# Understanding Carbohydrate Counting

### Other Nutrition Facts Label Considerations

- **Fiber.** Includes all soluble and insoluble fiber. According to the American Dietetic Association, if a food has 5 or more grams of fiber per serving, subtract half of the grams of fiber from the Total Carbohydrate serving of that food (J AM Diet Assoc, 2008, p 883–888).
- **Sugar.** Includes all naturally occurring and/or added sugars and is included in the Total Carbohydrate. Do not discount a food because it is high in sugar. Some healthy foods have naturally occurring sugars like fruit and milk.
- **Sugar alcohol.** Reduced-calorie sweeteners such as mannitol, sorbitol, and xylitol are sugar alcohols. American Diabetes Association (ADA) recommendations for foods having 5 or more grams of sugar alcohol, are to subtract half of the amount of sugar alcohol from the Total Carbohydrate (Diabetes Care, 2008, p 65–66).
- **Net carbs, impact carbs, active carbs.** Beware, these terms are NOT regulated by the FDA. The terms were created by food manufacturers to appeal to the low-carb diet market. The manufacturer has subtracted all fiber and sugar alcohol from the Total Carbohydrate to make it more appealing to the consumer. Instead, do the math yourself following the ADA guidelines.





Food labels in practice. Calculate the carbohydrate.

## Nutrition Facts

Servings Size 1 Cup (148g)

Servings Per Recipe 3

### Amount Per Serving

**Calories:** 84      Calories from Fat 4

**% Daily Value\***

**Total Fat:** 0g      **1%**

Saturated Fat: 0g      **0%**

Trans Fat: 0g

**Cholesterol** 0mg      **0%**

**Sodium** 1mg      **0%**

**Total Carbohydrate** 21g      **7%**

Dietary Fiber 4g      **14%**

Sugars 15g

**Protein** 1g

1. Calculate the Total Carbohydrate for a 1/2 cup serving of this product.

Answer

2. Calculate the Total Carbohydrate for a 2 cup serving of this product.

Answer

## Nutrition Facts

Servings Size 2.5 oz (68g)

Servings Per Recipe 3

### Amount Per Serving

**Calories:** 160      Calories from Fat 10

**% Daily Value\***

**Total Fat:** 1g      **2%**

Saturated Fat: 0g      **0%**

Trans Fat: 0g

**Cholesterol** 0mg      **0%**

**Sodium** 660mg      **27%**

**Total Carbohydrate** 50g      **17%**

Dietary Fiber 18g      **72%**

Sugars 7g

**Protein** 7g

3. Calculate the Total Carbohydrate for one serving, minus the fiber.

Answer

4. Calculate the Total Carbohydrate for 1/2 serving, minus the fiber.

Answer

# Understanding Carbohydrate Counting

## Carbohydrate Choices

While reference guides and Nutrition Facts Labels may offer the most reliable resources for carbohydrate counting, you may not always have them on hand.

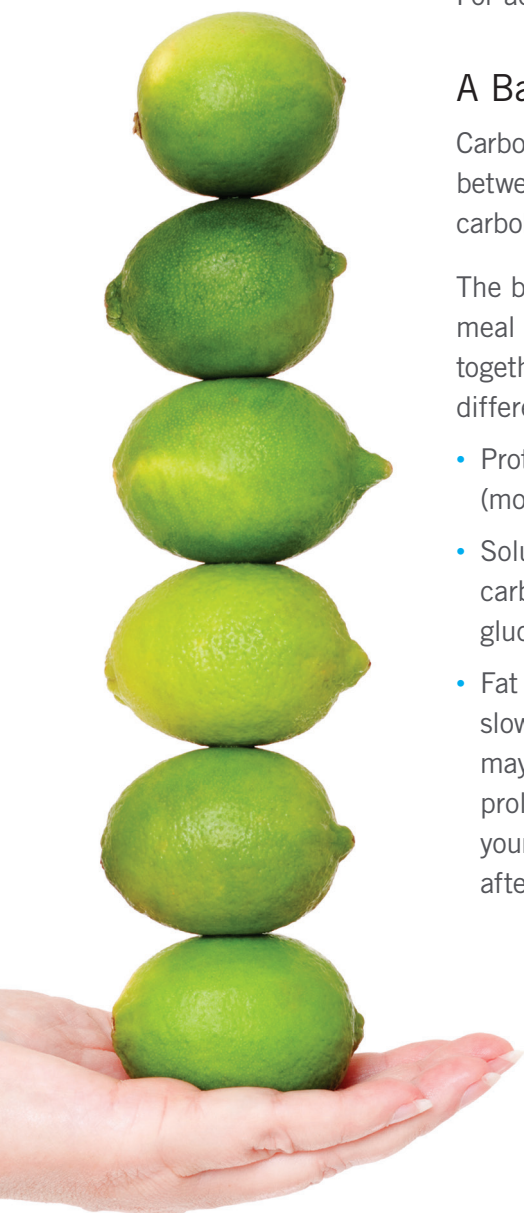
The 15-Gram Carbohydrate Reference Guide serves as an easy-to-remember guide. Each food item represents a 15-gram carbohydrate choice. These are NOT suggested portions, but an added resource for estimating carbohydrate. For additional resources, refer to Appendix D.

## A Balancing Act: Other Influences

Carbohydrate counting is an essential part in helping you to maintain a balance between the foods you eat and the insulin you take. Sometimes, even with accurate carbohydrate counting, post-meal blood glucose may not work out as expected.

The balance of protein, fat, and carbohydrate in a meal has an effect on post-meal blood glucose. Additionally, eating carbohydrate alone versus eating it together with foods high in protein, fiber, or fat may result in an altogether different post-meal blood glucose response.

- Protein, to a lesser degree, will convert to glucose. If eaten in large amounts (more than the normal 15–20% of calories) it may increase post-meal glucose.
- Soluble fiber slows down the digestion of the food. Glucose released from carbohydrate will reach your bloodstream slower and may delay the glucose response.
- Fat does not convert to glucose. However, if eaten in large amounts, fat can slow down the digestion of carbohydrate and the release of glucose. This may result in low blood glucose soon after the meal, followed by a delayed or prolonged elevation in your blood glucose. In addition, certain fats can cause your body to be more resistant (less sensitive) to insulin for a period of time after eating them. This may result in higher than expected blood glucose levels.



## 15-Gram Carbohydrate Reference Guide

Bread	15 grams
Bagel, large	1/4 (1 oz)
Bread, white or whole wheat	1 slice (1oz)
Biscuit, 2 1/2 in. across	1
Corn bread, 1 3/4 in. cube	1 (1/2 oz)
Crackers, round butter type or saltine	6
English muffin	1/2
Hamburger or hotdog bun	1/2
Pancake, 4 in. across, 1/4 in. thick	1
Pretzels	3/4 oz
Stuffing, bread	1/3 cup
Tortilla, corn, 6 in. across	1
Tortilla, flour, 6 in. across	1
Tortilla flour, 10 in. across	1/3
Snack chips, tortilla or potato	9–13
Taco shell, 5 in. across	2
Waffle, 4 in. square or 4 in. across	1

Starchy Vegetables and Beans	15 grams
Beans, baked	1/3 cup
Beans, dried, cooked (kidney, pinto, black, white, garbanzo, lima, etc.)	1/2 cup
Corn	1/2 cup
Corn on the cob, large	1 (5 oz)
Lentils, cooked	1/2 cup
Mixed vegetables (w/ corn, peas, or pasta)	1 cup
Peas, dried (green, split black-eyed)	1/2 cup
Potato, baked with skin	1/4 large (3 oz)
Potato, mashed	1/2 cup
Potato, french-fried, oven baked	1 cup (2 oz)
Squash, winter (acorn, butternut)	1 cup
Sweet potato, yam, plain	1/2 cup

Milk Products	12–15 grams
Milk (skim, low-fat, whole)	1 cup
Yogurt, plain or artificially sweetened	2/3 cup

Cereal and Grains	15 grams
Bran cereal, dry, oat	1/4 cup
Bran cereal, dry, wheat	1/2 cup
Cereal, unsweetened, ready-to-eat	3/4 cup
Cereal, puffed	1 1/2 cup
Granola, low-fat or regular	1/4 cup
Grits, cooked	1/2 cup
Oatmeal, cooked, unsweetened	1/2 cup
Pasta, cooked	1/3 cup
Rice, cooked, white or brown	1/3 cup

Fruit	15 grams
Apple, unpeeled, small	1 (4 oz)
Banana, extra small	1 (4 oz)
Berries (black or blue)	3/4 cup
Canned fruit (fruit cocktail, pears, peaches)	1/2 cup
Grapefruit, large	1/2 (11 oz)
Grapes, small	17 (3 oz)
Melon (cantaloupe, honeydew)	1 cup cubed
Peach, medium, fresh	1 (6 oz)
Orange, small	1 (6 1/2 oz)
Pear, large	1/2 (4 oz)
Pineapple, fresh	3/4 cup
Raisins	2 Tbsp
Strawberries, fresh, whole	1 1/4 cup
Fruit Juice: Orange, apple, grapefruit and pineapple	1/2 cup
Fruit Juice: grape, prune, and juice blend	1/4 cup

Other	15 grams
Mixed dish or casserole (chili, mac and cheese, tuna noodle, etc.)	1/2 cup
Ice cream (regular, light, no-sugar added)	1/2 cup
Cookie (chocolate chip, small)	2 1/4 in.

(Adapted from Exchange Lists for Diabetes. ADA, May 2008)



# Understanding Carbohydrate Counting



### Training Tip

If you feel these influences are impacting your blood glucose, review the “Helpful Features” and “Evaluating and Fine-Tuning Your Insulin Dose Settings” chapters for some possible solutions. Also, speak with your healthcare provider to discuss tips on how to better manage your balance of nutrients.

### Glycemic Index and Glycemic Load

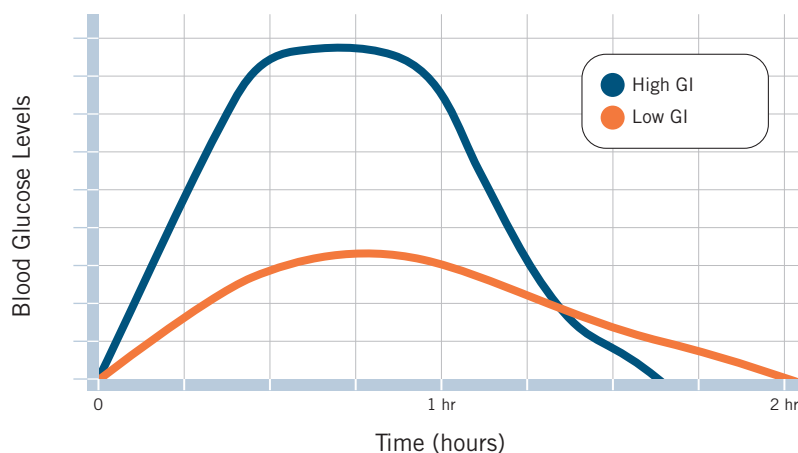
Another factor that may impact your post-meal blood glucose is the Glycemic Index (GI) of food. The GI system ranks carbohydrate foods according to their effect on blood glucose; a high GI food would raise blood glucose while a low GI would have less of an effect. This system maintains that a 50-gram serving of one carbohydrate may have an altogether different effect than a 50-gram serving of another carbohydrate.

Studies show mixed results as to whether following a low GI diet will actually improve your blood glucose control. It is often criticized because it does not take into account the volume of food you eat.

Glycemic Load (GL) takes the GI one step further and considers the serving size. A quick example shows that while watermelon has a high GI, when you look at GL, it is low. This means that unless you are planning to eat a very large serving of watermelon, it will have minimal impact on your post-meal blood glucose.

According to the American Diabetes Association (ADA), “the use of GI and GL may provide a modest additional benefit over that observed when total carbohydrate is considered alone.” Additionally, the ADA advises “low-glycemic index foods that are rich in fiber and other important nutrients are encouraged” (Diabetes Care, 2008, p 64)

### Effect of Glycemic Index on Blood Glucose Values



(Adapted from Galgani, 2006)



Notes: \_\_\_\_\_

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# Understanding Carbohydrate Counting



### Training Tip

Each item is equal to one serving of alcohol:

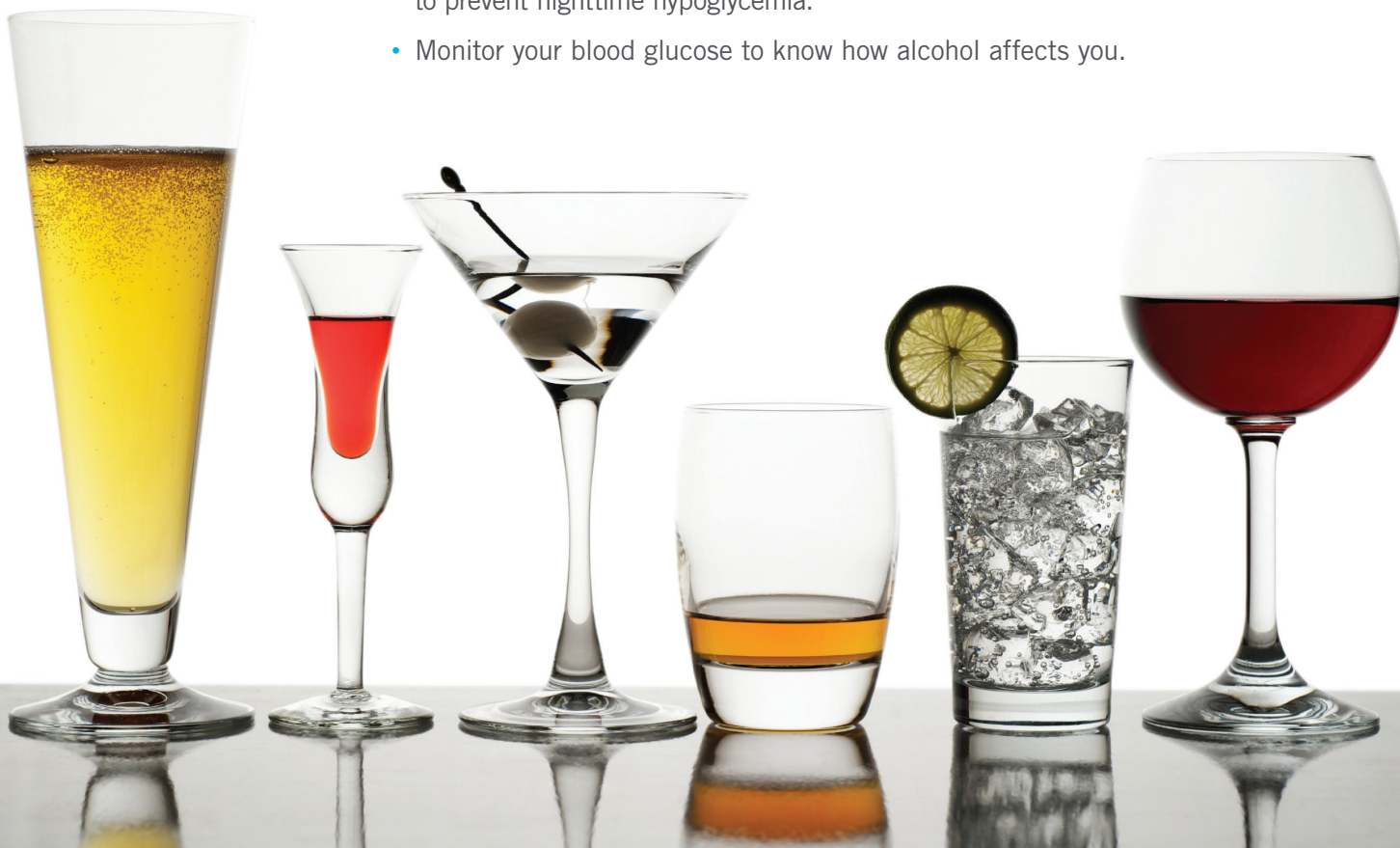
- 12 oz beer
- 5 oz wine
- 1 1/2 oz liquor

### Alcohol

The calories from alcohol will not increase post-meal blood glucose. Alcohol itself does not contain carbohydrate, however, some alcoholic beverages may contain large amounts of carbohydrate. More importantly, alcohol interferes with the liver's efforts to release blood glucose which may result in hypoglycemia.

The bottom line is that alcoholic beverages can have an unpredictable effect on your blood glucose. Discuss with your healthcare provider whether alcohol is safe for you. If you do choose to drink, please follow these guidelines:

- Drink alcohol only when your diabetes is well managed.
- Do not drink on an empty stomach. Eat before or with your drink.
- For women, limit alcoholic beverages to one or fewer per day.
- For men, limit alcoholic beverages to two or fewer per day.
- Avoid drinking alcohol with added sugar; like sweet wines or liqueurs.
- Avoid sweet mixers; like regular soda, fruit juice, and margarita mix.
- Monitor blood glucose before drinking and before you go to bed.  
If below 140 mg/dL, treat as hypoglycemia and eat carbohydrate to prevent nighttime hypoglycemia.
- Monitor your blood glucose to know how alcohol affects you.



## Nutrition Guide Wrap-Up

There is no specific diet for diabetes. While blood glucose success is the primary goal of diabetes management, there is more to consider; an overall healthy eating pattern is important for everyone. Healthy lifestyle choices reduce the likelihood of heart disease, osteoporosis, stroke, high blood pressure, and some types of cancer.

A healthy eating pattern will also ensure that you get the right amount of vitamins and minerals, giving you the chance to feel your best every day. If you focus on these food choices, you will reap the benefits of healthy eating and find they will help you meet your blood glucose goals. Try to include the following food items each day.

- Fresh, whole foods
- Fresh fruits and vegetables
- Foods with a variety of colors
- Whole grains rather than processed or refined
- Lean meats
- Low-fat or fat-free dairy product



### Checkpoint

What additional food items (other than carbohydrate) may impact your post-meal blood glucose?

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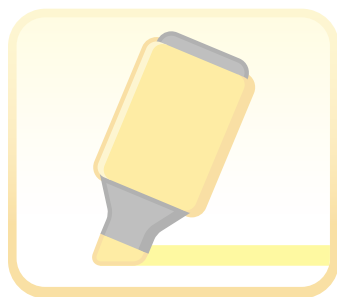
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*Answer*



# Understanding Carbohydrate Counting



### Chapter Highlights

- Carbohydrate is the body's main source of fuel and has the greatest impact on blood glucose. Carbohydrate foods are sugars, starches, and fiber.
- Carbohydrate counting is a method of identifying and estimating carbohydrate foods and amounts.
- Carbohydrate counting and insulin pump therapy work well together, allowing you to easily bolus for all of the carbohydrate that you eat.
- To count carbohydrate, first you have to identify the foods that contain carbohydrate by using food lists.
- Next, you will need to know how much food you are eating.
- Finally, you will estimate the amount of carbohydrate in the food you are eating by using Nutrition Facts Food Labels, reference books, and carbohydrate lists.



### Checkpoint Answers

1. Of the three major nutrients, carbohydrate, protein, and fat, which has the greatest impact on your blood glucose?

*Answer: Carbohydrate*

2. What two items on the Nutrition Facts Label are most helpful when counting carbohydrate?

*Answer:*

- *Serving size*
- *Total carbohydrate*

3. What additional food items (other than carbohydrate) may impact your post-meal blood glucose?

*Answer:*

- *Protein*
- *Fiber*
- *Fat*
- *Glycemic Index/Load*
- *Alcohol*



## Activity Answer Key – Food Labels in Practice

1. Calculate the Total Carbohydrate for a 1/2 cup serving of this product.

*Answer: 10.5 grams*

2. Calculate the Total Carbohydrate for a 2 cup serving of this product.

*Answer: 42 grams*

3. Calculate the Total Carbohydrate for one serving, minus the fiber.

*Answer: 41 grams (see fiber consideration on page 48)*

4. Calculate the Total Carbohydrate for 1/2 serving, minus the fiber.

*Answer: 20.5 grams (see fiber consideration on page 48)*

## Activity Answer Key – Where's the Carbohydrate?

- |  |  |  |
|--|--|--|
| <input checked="" type="checkbox"/> Bread                | <input type="checkbox"/> Hot Dogs                        | <input type="checkbox"/> Fat-free Hot Dogs             |
| <input type="checkbox"/> Cheese                          | <input checked="" type="checkbox"/> Whole Milk           | <input checked="" type="checkbox"/> Beans              |
| <input checked="" type="checkbox"/> Tofu                 | <input checked="" type="checkbox"/> Fat-Free Milk        | <input type="checkbox"/> Soy Sauce                     |
| <input type="checkbox"/> Shrimp                          | <input checked="" type="checkbox"/> Spinach              | <input checked="" type="checkbox"/> Pizza              |
| <input checked="" type="checkbox"/> Apples               | <input checked="" type="checkbox"/> Potatoes             | <input type="checkbox"/> Mustard                       |
| <input checked="" type="checkbox"/> Sugar                | <input checked="" type="checkbox"/> Tortillas            | <input checked="" type="checkbox"/> French Fries       |
| <input type="checkbox"/> Steak                           | <input type="checkbox"/> Eggs                            | <input checked="" type="checkbox"/> Light Beer         |
| <input checked="" type="checkbox"/> Pasta                | <input checked="" type="checkbox"/> Yogurt               | <input type="checkbox"/> Mayonnaise                    |
| <input checked="" type="checkbox"/> Rice                 | <input checked="" type="checkbox"/> Sugar-Free Pudding   | <input checked="" type="checkbox"/> Ice Cream          |
| <input checked="" type="checkbox"/> Beer                 | <input checked="" type="checkbox"/> Coleslaw             | <input checked="" type="checkbox"/> Peanut Butter      |
| <input checked="" type="checkbox"/> Barbecue Ribs        | <input type="checkbox"/> Fish                            | <input checked="" type="checkbox"/> Sugar-Free Cookies |
| <input checked="" type="checkbox"/> Ranch Salad Dressing | <input checked="" type="checkbox"/> Marinara Pasta Sauce | <input checked="" type="checkbox"/> Chicken Fingers    |
| <input type="checkbox"/> Sugar-Free Gelatin              | <input type="checkbox"/> Sliced Turkey                   | <input checked="" type="checkbox"/> Ketchup            |

# Troubleshooting

As you know, the more you understand about your blood glucose patterns and act upon that knowledge, the better able you will be to manage your diabetes.

Unexplained high or low blood glucose can be troublesome. While an imbalance between insulin, food, and activity is most often the cause, there are several other factors to consider when pumping insulin and troubleshooting your blood glucose.

This chapter is designed to enhance your insulin pump problem-solving skills by providing strategies that will help you identify the problem, determine the cause, and find a solution to the unexpected.

Key topics include:

- Troubleshooting high and low blood glucose
- Troubleshooting infusion set concerns
- Managing time-off from your t:slim Pump
- Managing sick days






Troubleshooting

Troubleshooting Your Blood Glucose

When pumping insulin, you run the risk of highs and lows just as you did with manual injections. Many of these causes, like overeating or missing an insulin bolus will be easy to identify, however some will be new to you.

The best way to know if your blood glucose is high or low is to monitor it frequently. Insulin pump users typically monitor their blood glucose at least four times a day, and more frequently when starting insulin pump therapy. Although you may not always be able to feel when your blood glucose is high or low, it is important to learn how to recognize the symptoms early. Let’s review by working through the activity below.

 Mark each symptom with either an **H** for high blood glucose, or **L** for low blood glucose.

Hungry <input type="checkbox"/>	Irritable <input type="checkbox"/>	Nausea <input type="checkbox"/>	Fast heartbeat <input type="checkbox"/>	Confusion <input type="checkbox"/>
Shaky <input type="checkbox"/>	Blurred vision <input type="checkbox"/>	Fatigue <input type="checkbox"/>	Extreme thirst <input type="checkbox"/>	Headache <input type="checkbox"/>
Drowsy <input type="checkbox"/>	Urinating often <input type="checkbox"/>	Sweaty <input type="checkbox"/>	Poor judgment <input type="checkbox"/>	Anxious <input type="checkbox"/>

You may experience the same symptoms for both high and low blood glucose. It is also possible that you may have completely different symptoms or none at all. For this reason, it is best to monitor your blood glucose regularly to ensure that you are within your target goals.

Hyperglycemia

Hyperglycemia (high blood glucose) occurs when there is too much glucose and not enough insulin in your blood. Stress, illness, medication, inactivity, and underestimation of carbohydrate which can lead to an inadequate bolus are all common causes of high blood glucose.

## Diabetic Ketoacidosis (DKA)

When insulin is not available, blood glucose can reach dangerous levels. If left untreated, Diabetic Ketoacidosis (DKA), a life-threatening condition can occur.

- DKA occurs when there is not enough insulin available to help glucose enter the cells to be used as energy.
- Without glucose, fat is used for energy, resulting in a waste product called ketones.
- If too many ketones accumulate (which can happen rapidly), the condition becomes very serious and medical attention is required. This is called Diabetic Ketoacidosis.

Early Symptoms of DKA	Symptoms of Severe DKA
<ul style="list-style-type: none"><li>• Thirst or dry mouth</li><li>• Frequent urination</li><li>• High blood glucose</li><li>• Ketones</li></ul>	<ul style="list-style-type: none"><li>• Nausea and vomiting</li><li>• Abdominal pain</li><li>• Fatigue</li><li>• Labored breathing</li><li>• Fruity breath odor</li></ul>

### To Prevent DKA:

- Monitor your blood glucose at least four to six times per day.
- Check for ketones anytime you have symptoms of DKA (see above).
- If your blood glucose is above 250 mg/dL two times in a row, follow Treatment Guidelines for Hyperglycemia on page 64.

### Be Prepared, Always Carry the Following Supplies:

- Insulin and syringes
- Ketone testing strips
- Glucose meter and strips
- Infusion sets and cartridges
- t:slim Wallet Card



### Checkpoint

What are the signs and symptoms of severe Diabetic Ketoacidosis?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_
- 6) \_\_\_\_\_

# Troubleshooting



### t:slim Tip

Your t:slim Pump is equipped with a High Blood Glucose Reminder that can be programmed to remind you to re-check your blood glucose following an episode of hyperglycemia. This feature is especially helpful when first starting pump therapy. Refer to your *t:slim User Guide* to learn how to use this feature.



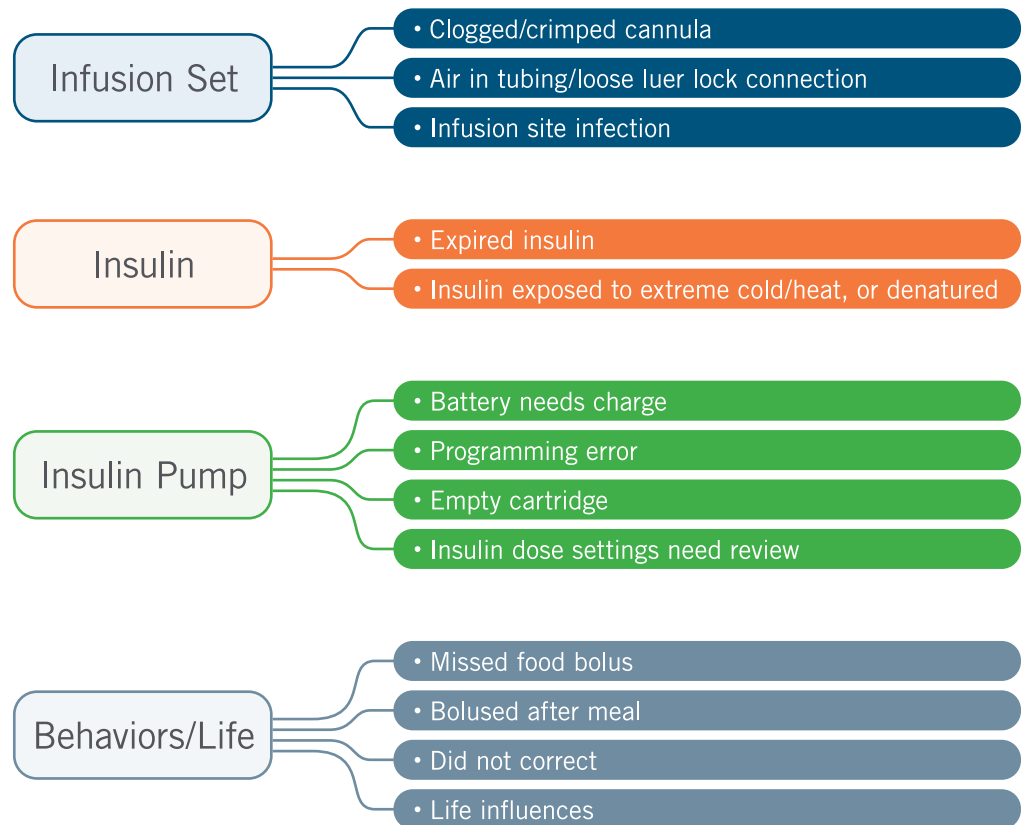
### Checkpoint

What are the four main categories to explore when troubleshooting hyperglycemia?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

## Troubleshooting Hyperglycemia

While insulin pump therapy offers many benefits, unexpected episodes of hyperglycemia can occur if insulin delivery is interrupted. In the absence of rapid-acting insulin and with no long-acting insulin available in your blood stream (as before, when taking injections) your blood glucose can rise rapidly. The chart below outlines various troubleshooting categories that will need to be investigated when your blood glucose is not responding to a correction dose of insulin. If the problem continues or you do not find a solution, contact your healthcare provider.



## Hyperglycemia Troubleshooting Guide

Possible Cause ⬇	What to Check ⬇	If Yes, Proceed with Action ⬇
Infusion Set:		
Leaking at the site	Wetness at site	Change infusion set at site. Rotate site.
Not changed within 2–3 days	Load history or site reminder	
Expired infusion set	Package expiration date	
Infection at site	Redness, swelling at site	
Cannula:		
Crimped, dislodged, or clogged	Infusion site	Change infusion set at site. Rotate site.
Placed in scar tissue		
Tubing:		
Air bubbles	Air bubbles or spaces in tubing	Detach tubing from site; fill tubing with insulin to push air out; reattach tubing to site.
Not filled when set was last changed	Load history	Detach tubing from site; complete load sequence; reattach tubing to site.
Luer lock loose from tubing	Luer lock/tubing connection	Detach tubing from site; tighten luer lock at connection; fill tubing with insulin to push air out; reattach tubing at site.
Insulin:		
Expired or denatured	Expiration date on insulin vial. Cloudy or clumpy appearance	Discard insulin vial. Fill new cartridge with new insulin. Change entire infusion set.
Exposed to extreme cold, heat, or sunlight	Insulin quality in vial. Storage temperature	Discard insulin and cartridge. Fill new cartridge with new insulin. Change entire infusion set.
In cartridge longer than recommended	Load history	
Insulin Pump:		
Programming error (insulin dose settings, time/date)	Personal profiles, time/date settings	Reprogram as necessary.
Alarm sounded	Alarm history	Identify alarm. Take action as outlined in <i>t:slim User Guide</i> or call Customer Technical Support at 877-801-6901.
Battery dead	Battery icon	Charge battery.
Insulin dose settings need review	Refer to Chapter 8 and discuss with your HCP	Contact HCP to discuss need for evaluation and adjustments to settings.
Behaviors/Life:		
Missed bolus	Bolus history	Bolus as needed to correct.
Bolused after meal		
Did not correct		
Life influences	Stress, illness, medication, inactivity	Discuss action plan with HCP.



Troubleshooting



t:slim Tip

When dosing by syringe and you want your t:slim Pump to track IOB.

- 1. Disconnect your t:slim Pump from your body.
- 2. Allow your t:slim Pump to calculate the dose.
- 3. Deliver the bolus into the air.
- 4. Reconnect your t:slim Pump to the infusion site.



Training Tip

If your BG is above 250 mg/dL two times in a row and/or is not responding to a correction bolus, test for ketones, change entire infusion set and site, correct by injection, and refer to Hyperglycemia Troubleshooting Guide on page 63.

Treatment Guidelines for Hyperglycemia

If blood glucose (BG) is above target but below 250 mg/dL, take a correction bolus via your t:slim Pump as directed. Recheck BG in 1 to 2 hours. If BG is not responding to treatment, test ketones (blood or urine) and follow guidelines below.

If BG remains above 250 mg/dL, or you have symptoms of DKA, test for ketones

If Ketones are Negative:	If Ketones are Positive: <i>(or, if BG is not responding to correction bolus)</i>
<ul style="list-style-type: none"><li>• Visually inspect entire infusion set and site. Correct any problems if identified. See Troubleshooting Guide on page 63.</li><li>• Use correction factor to calculate and administer an insulin injection by syringe or pen.</li><li>• Drink 8 oz of sugar-free fluids every 30 minutes to prevent dehydration.</li><li>• Continue to monitor every 1–2 hours until BG returns to normal.</li><li>• If BG is not responding to the correction bolus, follow procedure to the right for positive ketones.</li></ul>	<ul style="list-style-type: none"><li>• Use correction factor to calculate and administer an insulin injection by syringe or pen.</li><li>• Change entire infusion set and site using a new cartridge and new insulin.</li><li>• Drink 8 oz of sugar-free fluids every 30 minutes to prevent dehydration.</li><li>• Continue to monitor every 1–2 hours until BG returns to normal.</li><li>• If BG is not responding to treatment, contact your healthcare provider IMMEDIATELY.</li></ul>

(Adapted from AADE, 2008)

Air in the Tubing

If air is present in the infusion set tubing, air will be delivered in place of your insulin dose. Hyperglycemia may result. Periodically check your tubing for air bubbles or gaps. Also check to ensure that the luer lock is tightly connected. If air is present in the tubing or if the luer lock connection is loose, take the following actions:

- 1. Disconnect tubing from the site.
- 2. Tighten luer lock.
- 3. Fill tubing with insulin to push air out.
- 4. Reattach tubing at site.





## What would you do?

For lunch you have the usual, a sandwich, potato chips, and a side salad. You enter your pre-meal blood glucose of 121 mg/dL and 56 grams of carbohydrate into your t:slim Pump. You bolus as usual. Three hours after lunch, your blood glucose is 276 mg/dL. You are very busy at work, so you quickly bolus to correct. Two hours later, you feel nauseous and realize you have been urinating a lot. You check your blood glucose. It is now 399 mg/dL.

1. What should you do?
2. What do you think is the cause?
3. What could you have done differently?

*Note: Jot down your answers and discuss with your healthcare provider. Refer to page 73 for a discussion.*

Notes: \_\_\_\_\_

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Troubleshooting



t:slim Tip

Your t:slim Pump is equipped with a Low Blood Glucose Reminder that can be programmed to remind you to re-check your blood glucose following an episode of hypoglycemia. To get the best use out of this feature, please enter all blood glucose values into your t:slim Pump. Refer to your *t:slim User Guide* to learn how to use this feature.

Treatment Guidelines for Hypoglycemia

Hypoglycemia (low blood glucose) occurs when there is too much insulin and not enough glucose in your blood. Some of the more common causes of hypoglycemia are increased or unexpected activity and overestimation of carbohydrate leading to a larger bolus than needed. Mild hypoglycemia is self-treated while a severe hypoglycemic reaction usually requires assistance.

Treatment Guidelines for Mild Hypoglycemia

- Self-treated by taking fast-acting carbohydrate following Rule of 15 (see below).
- Typically, symptoms do not occur until blood glucose drops below 70 mg/dL, however symptoms do vary in individuals.
- Some people are unable to recognize hypoglycemia, a condition called hypoglycemia unawareness. Talk to your healthcare provider if you feel this condition applies to you.

Rule of 15 – When BG is Less than 70 mg/dL			
Eat 15 grams of fast-acting carbohydrate	Monitor BG after 15 minutes	Repeat treatment if BG is less than 70 mg/dL	Repeat monitoring and treatment until BG returns to normal range
Fast-Acting 15 Gram Carbohydrate Sources			
<ul style="list-style-type: none"><li>• 3–4 glucose tablets</li><li>• 1 tube of glucose gel (15g)</li><li>• 1/2 cup of juice or regular soft drink</li><li>• 1 cup of skim milk</li></ul>		<ul style="list-style-type: none"><li>• 1 Tbsp of honey or syrup</li><li>• 3 graham cracker squares</li><li>• 6 saltine crackers</li><li>• 2 Tbsp of raisins</li></ul>	

(Adapted from ADA, 2014)

## Treatment Guidelines for Severe Hypoglycemia

- Requires assistance. When hypoglycemia is severe, you may be unable to communicate treatment guidelines.
- Plan ahead. Wear medical identification and discuss a treatment plan with your friends, family members, and/or caregivers. They should be instructed to call 911 if you become unresponsive, unusually aggressive, unconscious, or have seizures.
- A glucagon emergency kit is used to treat severe hypoglycemia. It should be kept on hand and will require a prescription from your healthcare provider. Glucagon is administered by injection and almost always by someone else. It is a good idea to read through the instructions for use and train a close friend or family member how to inject glucagon. Review the steps on an annual basis and replace glucagon when expired.



List some factors that you believe may have caused hypoglycemia in the past.

1.

2.

3.

*Do you notice a trend? Discuss these causes with your healthcare provider if they continue.*

# Troubleshooting



## Checkpoint

What is used to treat a severe episode of hypoglycemia?

Answer

## Troubleshooting Hypoglycemia

Hypoglycemia is most often caused from too much insulin and not enough food. The guide below may help uncover some possible causes of hypoglycemia that you may have not considered.

### Hypoglycemia Troubleshooting Guide

Cause	Action
Not allowing t:slim to calculate bolus	• Bolus by entering grams of carbohydrate and blood glucose.
Carbohydrate counting error	• Refer to Chapter 4 for help with carbohydrate counting.
Insulin stacking (correcting too soon)	• Enter all blood glucose readings into your t:slim Pump.
Basal rate set too high	• Refer to Chapter 8 and discuss with your healthcare provider.
Bolus dose settings inaccurate	• Refer to Chapter 8 and discuss with your healthcare provider.
Programming error	• Check Personal Profiles to ensure that your insulin dose settings are correct.
Insulin duration setting not accurate	• Refer to Chapter 8 and discuss with your healthcare provider.
Exercise or activity	• Refer to Chapter 6 for more information about exercise and activity.
Alcohol	• Refer to Chapter 4 for more information about alcohol and diabetes.

It is not recommended that you stop insulin pump delivery when you experience hypoglycemia. Treat by following the Rule of 15 on page 66. If you continue to experience episodes of unexplained hypoglycemia, contact your healthcare provider for help determining the cause. It may be a matter of adjusting your insulin dose settings or improving your carbohydrate counting skills.

## Troubleshooting Your Infusion Set

It is always helpful to be aware of conditions that may contribute to infusion set issues. These include:

- Not using clean technique when inserting the infusion set
- Allergies or sensitivities to the cannula, adhesive, or dressing
- Improper site location selection
- The infusion set you are using may not be ideal for you. Discuss options with your healthcare provider

Please discuss any recurrent infusion site problems with your healthcare provider.

### Infusion Set Troubleshooting Guide

Problem	Action
Rash/itching	<ul style="list-style-type: none"><li>• Consider that a new soap or lotion may be creating a reaction.</li><li>• Cleanse the skin as usual and create a barrier using site preparation products.</li><li>• If this does not help, you may be allergic to the cannula, tape, or adhesive. Try changing them out one at a time to identify the problem.</li></ul>
Skin bumps, scars, or pimples	<ul style="list-style-type: none"><li>• Replace the infusion set every 2–3 days.</li><li>• Observe the site for infection (warm, red, or a discharge present).</li><li>• Call your healthcare provider with signs and symptoms of infection and avoid placing infusion sets in these areas.</li></ul>
Poor sticking of adhesive at site	<ul style="list-style-type: none"><li>• Always make sure the site is clean and dry before inserting cannula.</li><li>• Wipe site with a site preparation product and allow it to dry.</li></ul>
Bleeding at site	<ul style="list-style-type: none"><li>• Bleeding under the skin may cause a blood-filled sac to form.</li><li>• If you feel a bump, remove immediately and insert a new infusion set at another site.</li></ul>
Blood in cannula or tubing	<ul style="list-style-type: none"><li>• Change out the infusion set and/or tubing.</li><li>• Blood clotting can cause clogging which will interfere with insulin delivery.</li></ul>
Bruising at site	<ul style="list-style-type: none"><li>• Change the site location. Do not insert into a bruised area.</li></ul>
Insulin leaking around site	<ul style="list-style-type: none"><li>• Change infusion set at site.</li><li>• Try a longer cannula or one that inserts deeper into the skin.</li></ul>
High blood glucose following site change	<ul style="list-style-type: none"><li>• Check that the tubing and cannula have been filled after inserting a new set.</li><li>• Check for bubbles in the tubing.</li><li>• You may choose to keep your old set in for 1–2 hours after inserting a new set to ensure that the prior bolus has been fully absorbed.</li></ul>
Repeated infusion set problems	<ul style="list-style-type: none"><li>• Try a different type of infusion set.</li></ul>

Troubleshooting



Training Tip

Remember, long-acting insulin remains active in your body for 12 to 24 hours once it is injected. If you have replaced your basal insulin with long-acting insulin injections, make sure that all of the long-acting insulin has cleared your body before reconnecting to your t:slim Pump and resuming basal delivery. Contact your healthcare provider for more information regarding the duration of your long-acting insulin and resuming basal delivery.

Managing Time-Off From Your t:slim Pump

It may be necessary to disconnect from your t:slim Pump for a short period of time. For example during contact sports, a day at the beach, a medical procedure, an insulin pump malfunction, or maybe you are just out of supplies. Check with your healthcare provider for specific instructions and a back-up plan for time-off of your t:slim Pump. Some general guidelines are provided below.

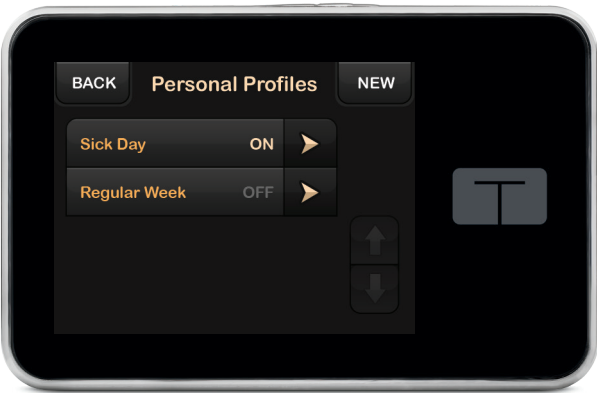
Time-Off Pump Guide

Time-Off Pump	Plan
1 hour or less	<ul style="list-style-type: none"><li>• Monitor BG. Treat for high or low BG as needed before disconnecting.</li></ul>
1–4 hours	<ul style="list-style-type: none"><li>• Determine the amount of time to disconnect from your t:slim Pump.</li><li>• Bolus the calculated amount of missed basal insulin for that period. Reduce amount for activity if necessary.</li><li>• Remove your t:slim Pump</li><li>• Cover for carbohydrate by reconnecting to your t:slim Pump or by injection.</li></ul>
Over 4 hours	<ul style="list-style-type: none"><li>• Refer to the back-up plan agreed upon by your healthcare provider</li></ul>

Managing Sick Days

Special care needs to be taken when you become ill. Hormones released during illness or stress can rapidly increase blood glucose. By following a few simple guidelines, you can minimize the effect of an illness on your diabetes.

Be Prepared. Plan ahead by stocking supplies and non-perishable food items. If you wait until you are sick, you may not have the energy to find what you need.





Supplies to Keep On Hand
Ketone testing strips
Blood glucose testing supplies: meter, strips, lancets, meter batteries
Rapid-acting insulin and syringes
Thermometer
Over-the-counter medications for colds, flu, diarrhea, vomiting

Foods to Keep On Hand
Sports drinks
Fruit juice
Regular and diet soda
Canned soup
Crackers
Regular gelatin
Instant pudding
Applesauce

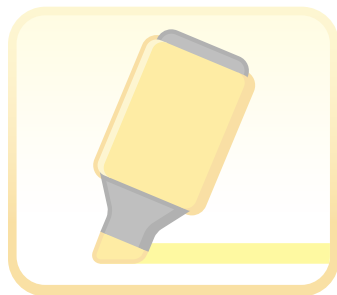
### Sick Day Action Plan

- Do not stop t:slim Pump insulin delivery. Continue taking insulin. You may need to use a temporary basal rate or create a Sick Day Personal Profile if more or less insulin is needed. Discuss this option with your healthcare provider.
- Monitor your blood glucose every 2 to 4 hours.
- Check ketones when blood glucose is over 250 mg/dL and anytime you have signs and symptoms of DKA including nausea or vomiting.
- Drink plenty of fluids. Choose water or decaffeinated, sugar-free fluids. Drink 1 cup (8 oz) every 1/2 to 1 hour to keep from becoming dehydrated.
- Eat foods with carbohydrate. If you are unable to eat, alternate sugar-free fluids with fluids that contain carbohydrate, i.e. sports drinks, soda, and fruit juice. Bolus as needed to cover the carbohydrate.

### When to Call Your Healthcare Provider

- If your blood glucose remains above 250 mg/dL and/or you have moderate to large ketones
- When you have persistent diarrhea
- If fever is over 100 degrees
- When you are vomiting and unable to take in fluids
- If you have severe abdominal pain
- When illness persists over 24 hours
- If you have unexplained symptoms

# Troubleshooting



### Chapter Highlights

- Troubleshooting involves a series of problem-solving steps to determine a cause and find a solution for unexplained blood glucose.
- High blood glucose (hyperglycemia) may be caused from problems associated with your infusion set, insulin, your t:slim Pump, or lifestyle/behaviors.
- When troubleshooting hyperglycemia refer to the troubleshooting guide on page 63.
- Hyperglycemia should be treated swiftly following guidelines provided on page 64.
- Diabetic Ketoacidosis (DKA) is a life-threatening condition that can result when high blood glucose is left untreated. Symptoms include: nausea, vomiting, fruity breath odor, and abdominal pain. Ketones are present. DKA requires immediate medical attention.
- A low blood glucose reaction (hypoglycemia) may be the result of a miscalculated bolus, a carb counting error, or insulin stacking.
- When experiencing hypoglycemia, using the Rule of 15, take 15 grams of fast-acting carbohydrate, wait 15 minutes, recheck blood glucose. Re-treat if necessary.
- Keep supplies on hand for sick days. When ill, do not disconnect your t:slim Pump. Check ketones, drink plenty of fluids, and if you are too ill to eat, replace meal carbohydrate with liquids containing carbohydrate.



### Checkpoint Answers

1. What are the signs and symptoms of severe Diabetic Ketoacidosis?  
*Answer: Ketones, nausea and vomiting, abdominal pain, fatigue, labored breathing, fruity breath odor*
2. What are the four main categories to explore when troubleshooting hyperglycemia?  
*Answer: Insulin, infusion set, t:slim Pump, behaviors/life issues*
3. What is used to treat a severe episode of hypoglycemia?  
*Answer: Glucagon emergency kit*



## Activity Answer Key – High Glucose or Low Glucose

Hungry:	H, L	Sweaty:	L
Shaky:	L	Fast heartbeat:	L
Drowsy:	H, L	Extreme thirst:	H
Irritable:	H, L	Poor judgment:	L
Blurred vision:	H	Confusion:	H, L
Urinating often:	H	Headache:	H, L
Nausea:	H	Anxious:	L
Fatigue:	H		

## Activity Answer Key – What Would You Do?

1. What should you do?

*Answer:* Check for ketones and follow the Treatment Guidelines for Hyperglycemia on page 64. Troubleshoot your t:slim Pump and infusion set using the Troubleshooting Guide on page 63.

2. What do you think is the cause?

*Answer:* A number of reasons need to be explored; crimped or dislodged cannula, occlusion/clog in the tubing, empty cartridge, incomplete bolus.

3. What could you have done differently?

*Answer:* Take action sooner. Do not delay. Nausea, frequent urination, and elevated BG are warning signs of DKA. Follow the guidelines for treating and troubleshooting hyperglycemia.

# Managing Physical Activity and Exercise

If you have struggled with balancing your blood glucose and physical activity in the past, there is good news.

Insulin pump therapy makes managing your diabetes much easier. Your t:slim Pump offers the flexibility and the benefit of adjusting your insulin doses before, during, and after exercise, as well as for other activities that may impact your blood glucose.

This chapter will walk you through the following stages of a successful exercise program:

- The “pre-game”
- The “warm up”
- The “workout”
- The “cool down”





# Managing Physical Activity and Exercise



### Training Tip

Talk with your healthcare provider before beginning an exercise program and also discuss any pre-existing medical conditions such as heart disease, high blood pressure, etc.

## The Pre-game – The Benefits of Physical Activity

Physical activity and exercise are important for everyone, but offer added benefits for people with diabetes. Some advantages are listed below:

- Strengthens the muscles, heart, and lungs and sharpens the mind
- Aids in weight management and weight loss
- Enhances blood glucose management
- Improves blood pressure and blood cholesterol levels
- Decreases insulin usage and increases glucose uptake
- Improves mood and overall well-being
- Helps control stress

Physical activity does not always have to be strenuous or intense to have a positive impact on your blood glucose, diabetes, and overall health. It should be fun so that you are encouraged to participate and enjoy all the benefits that it provides.



List your health expectations for exercising.

*Example: Increase my energy level.*

1.

2.

3.

4.

5.



## The Warm Up – General Tips to Help You Get Started

If you are new to insulin pump therapy, you may want to avoid beginning a new exercise routine. As you adjust to insulin pump therapy and have better management of your blood glucose, discuss with your healthcare provider the option of starting a new exercise plan.

The first step is to identify your personal activity goals. Next, identify how these activities may impact your blood glucose. The activity below will help you begin.



List current activities and/or activities you would like to make a part of your routine. Next, identify how these activities may affect your blood glucose.

Activity:

BG Affect:

Activity:

BG Affect:

Activity:

BG Affect:

Everyone's response to physical activity is different. Listed below are various factors that may affect your blood glucose during exercise.

- Duration and intensity of activity
- Prior activity and rest
- New to activity
- Size and number of muscles involved
- Hypoglycemic/low blood glucose event in the previous 24 hours
- IOB (insulin on board)
- When and what foods were last eaten
- Your emotional state
- Infusion site condition
- Temperature and humidity
- Whether or not you wear your t:slim Pump

Once you have selected the activity that is right for you, it is helpful to keep track of your progress. Good record keeping will help determine what works best for you. Monitor your blood glucose frequently. Keep detailed records of your blood glucose readings, carbohydrate intake, and the intensity and duration of your exercise. This information will help you identify any blood glucose trends for future activities.

Managing Physical Activity and Exercise



Checkpoint

When and how often should you monitor your blood glucose during exercise?

Answer

Exercise Pointers

- Monitor your blood glucose 15 to 30 minutes before the activity begins and again at the start of the activity to identify trends. Continue to monitor your blood glucose during the activity and following the activity. Keep records.
- Check your IOB before starting activity. It may help in deciding whether a snack is needed to prevent hypoglycemia.
- If your blood glucose is higher than 250 mg/dL, check for ketones. If ketones are present, do not exercise. Follow Hyperglycemia Treatment Guidelines in Chapter 5.
- If your blood glucose is less than 100 mg/dL, consider eating a snack without bolus coverage before you exercise. Monitor your blood glucose every 30 min to 1 hour during activity.
- Always wear medical identification.
- Try to exercise with a friend or in a group if you are new to exercising.
- Establish a routine by exercising at the same time each day to track blood glucose trends.
- Keep your blood glucose meter and strips easily accessible.
- Keep fast-acting carbohydrate with you to treat unexpected low blood glucose. Consider carrying glucagon if you have frequent, severe hypoglycemia.
- Drink plenty of fluids to prevent dehydration. Have fluids available during activity.
- Consider the need for insulin adjustment (discussed later in this chapter).

	7:00 am 35 Min.	2 Hrs.	1 Hr.	Easy	Easy	Easy
Intensity	Easy	Medium	Medium	Easy	Easy	Easy
Insulin (dose, IOB, temp rate)	No IOB, no temp rate	No IOB, no temp rate	No IOB, no temp rate	No IOB, no temp rate	No IOB, no temp rate	No IOB, no temp rate
BG Before	171 8:30 am	132 4:30 pm	124 10:30 am	136 11:00 am	151 8:30 am	136 5:30 pm
BG at Start	159 9:00 am	127 5:00 pm	136 11:00 am	25	142 9:00 am	151 5:30 pm
Snack Before (grams)	15	0	0	115 11:00 am	0	145 9:15 am
BG During	131 9:20 am	122 6:15 pm	30	0	20	120 10:30 am
Snack During (grams)	0	131 7:00 pm	136 12:30 pm	28	122	122
	119 9:40 am	40				

(Sample Exercise Log. See Appendix B for additional logs.)

## Wearing Your t:slim Pump During Exercise

Generally, it is not necessary to stop basal delivery during exercise as this can lead to hyperglycemia. However, some activities like contact sports would require the removal of your t:slim Pump. Typically, you should not disconnect for more than 1 hour. In this case, you may need to cover your missed basal insulin before you disconnect or after you reconnect. Check with your healthcare provider for specific guidelines.

Infusion sets are another consideration for physical activity. Follow the guidelines below:

- Select an area that will not be irritated during the activity; away from belt line or area of friction. Pulling or movement at the site can cause the cannula to kink or dislodge. Tuck tubing away or use a safety loop to prevent tugging or pulling at your site.
- Perspiration can cause the site to loosen. Consider using an antiperspirant at the site to prevent sweating. Cover your site with dressing or tape for added protection.
- Consider how you plan to wear your t:slim Pump during exercise. A variety of cases and clothing are available for you to comfortably wear your pump.



### Training Tip

Always consider your safety and the safety of your t:slim Pump if worn during exercise.



# Managing Physical Activity and Exercise



### t:slim Tip

The t:slim Pump is watertight and has been tested to a depth of 3 feet for up to 30 minutes, so your pump is safe in the event of accidental submersion. It is not recommended that you regularly swim, bathe, or shower with your t:slim Pump attached.

## The Workout – General Guidelines for a Successful Workout

Adding exercise to your routine may initially create challenges in managing your blood glucose. Understanding how exercise affects your blood glucose will take time. Keep in mind that every individual responds to exercise differently.

### Glucose Metabolism and Exercise

- Your muscles use mostly carbohydrate and fat for fuel when exercising. During the first few minutes of exercise, glycogen (stored glucose from muscle and liver) is used for energy. As exercise continues and for an extended period of time following exercise, fat also becomes a fuel source.
- The changes in metabolism following exercise can affect blood glucose for hours to days after completing the exercise.
- Typically, in individuals without diabetes, insulin levels drop during exercise. This helps to determine how much glucose and fat can be accessed for fuel.
- If insulin levels remain high, more blood glucose is used. As a result, glucose levels may drop rapidly unless carbohydrate is consumed.
  - » If insulin levels drop too low, then fat is able to be used for fuel and glucose levels remain high.
  - » Peak performance occurs when fuels available for energy are balanced with insulin levels, keeping blood glucose within normal range.
- Some individuals may experience hyperglycemia during exercise due to the release of adrenaline.





## Exercise Hypoglycemia

Blood glucose control requires a balance between food intake, insulin, and physical activity. Exercising the muscles enhances the body's sensitivity to insulin and increases the risk for hypoglycemia. Special care should be taken to avoid hypoglycemia during and following physical activity.

### Guidelines to Prevent Exercise Hypoglycemia:

- Set a temporary basal rate to reduce insulin delivery before, during, and after exercise.
- Eat carbohydrate 1 hour prior to exercise (if needed). Reduce or omit bolus coverage for this food. See fuel list below.
- Consider IOB. If you have active insulin remaining from a previous bolus, consider eating a larger snack. Check the IOB on your t:slim Pump screen.
- Eat 15 to 30 grams of carbohydrate for every 30 to 60 minutes of activity. Strenuous activity requires more fuel. A reduction in your insulin dose and/or more food intake may be needed.
- Do not rely on normal signs and symptoms of hypoglycemia during exercise (sweating, shaking, fatigue, rapid heart-beat). They can be masked by the body's normal reaction to exercise. Monitor your blood glucose during exercise.

Exercise Snack Options	Carbs
5 whole-grain crackers with cheese	15 grams
1 small protein bar (or 1/2 large)	15–35 grams
1 granola bar	20 grams
1 mini bagel (1 oz) with low-fat cream cheese	15–20 grams
1 cup low-fat milk	12 grams
1 cup low-fat chocolate milk	25 grams
8 oz non-sweetened yogurt	15 grams
1 oz trail mix	15 grams
2 graham crackers with peanut butter	25 grams
2 Tbsp. hummus and 1 small pita	25 grams
2 small cookies	22 grams



### Training Tip

#### A Word About Ketones and Exercise

When blood glucose is high, insulin levels are low. Low insulin levels combined with exercise triggers the liver to release stored glycogen (which is converted to glucose) for fuel. Because insulin levels are low, glucose cannot get into the cells to be used for energy. Your body then relies on fat for fuel. Ketones (the waste product of fat metabolism) build up in the blood and increase the risk of developing diabetic ketoacidosis (DKA). Refer to Chapter 5 Troubleshooting for details about DKA.

# Managing Physical Activity and Exercise



### Training Tip

By modifying your insulin dose, you may avoid the need to consume extra calories and carbohydrate in order to prevent hypoglycemia. This helps to support weight management.

### Temporary Basal Rate Tips When Exercising

The Temp Rate (temporary basal rate) feature in your t:slim Pump offers the option of making short-term adjustments to your basal rate before, during, and after exercise without permanently altering your current Personal Profile. You simply set a percentage of your basal rate that will override your current rate for a duration of up to 72 hours. Refer to Chapter 7 and/or your *t:slim User Guide* for information about using the Temp Rate feature.

- Adjustments will depend on the type, duration, and intensity of the exercise.
- A good starting place would be to set a Temp Rate running at 50–80% of your current basal rate.
- Since changes in basal rates take at least 1 hour to have an effect on blood glucose, the new rate is typically set to begin 1 to 2 hours before the activity begins. It continues through the duration of the activity and may continue for several hours to days following the activity.
- The Temp Rate adjustment you select will depend on your blood glucose before the activity.
- This feature works well for short, long, or spontaneous activities. It can prevent delayed hypoglycemia that may follow physical activity.





## Exercise Hyperglycemia

Though exercise is mostly associated with hypoglycemia, the risk of hyperglycemia is also present. The causes of exercise hyperglycemia are as follows:

- **Not enough insulin** – When insulin levels are low, glucose cannot move into the cells. This results in high blood glucose. Meanwhile, glycogen (stored glucose) is released from the liver and muscle causing even more glucose to be present in the blood. You may find that a correction bolus is needed during exercise. Discuss your insulin needs with your healthcare provider.
- **Hormones** – Adrenaline from the stress of competition or high-intensity exercise is released during anaerobic (sprint, weight lifting) exercise. This leads to increased glucose production, decreased glucose uptake into the cells, and elevated blood glucose.
- **Dehydration** – The lack of fluid concentration in the blood causes blood glucose readings to appear high. Do not confuse dehydration with actual high blood glucose. Drink ample fluids before, during, and after exercise. Sugar-free fluids are usually best, but depending on the intensity of the exercise, perspiration, and your blood glucose levels, you may need carbohydrate containing fluid. Intake amounts may vary.



### t:slim Tip

Your t:slim Pump offers the option of creating a separate Exercise Profile with basal and bolus delivery settings specific for that activity. Refer to Chapter 7 and/or your *t:slim User Guide* for a more detailed instruction on the use of Personal Profiles.



# Managing Physical Activity and Exercise



### Checkpoint

How many hours following an activity can exercise continue to affect your blood glucose?

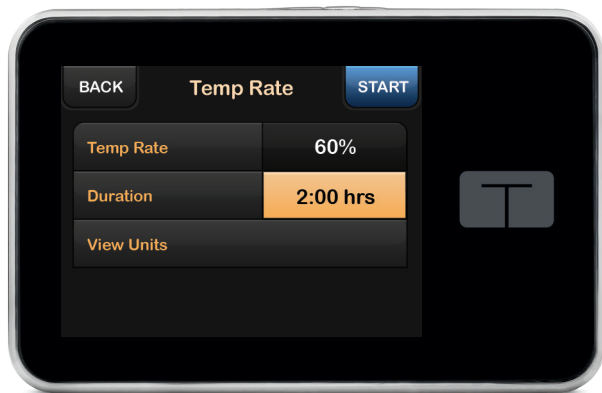
Answer

## The Cool Down – Post Exercise Guidelines

### Delayed Hypoglycemia

Your blood glucose can continue to drop following physical activity as a result of depleted glycogen (stored glucose). Muscles continue to use glucose from your bloodstream to replenish lost glycogen. The intensity and duration of the activity can impact your blood glucose for 24–36 hours plus after exercising. Following the guidelines below may help to prevent delayed hypoglycemia.

- Monitor your blood glucose after activity or exercise. Try to maintain a target goal of 100 to 140 mg/dL post exercise.
- If your blood glucose is lower than 100 mg/dL, eat a 15 to 30 gram carbohydrate snack. Be sure to check with your healthcare provider to determine your specific blood glucose goals.
- Continue to monitor your blood glucose every 4 to 6 hours post exercise, especially when following a new routine. This may include monitoring your blood glucose overnight following the activity.
- You may need a temporary adjustment in your basal insulin following exercise to prevent delayed hypoglycemia. The duration and intensity of your workout will determine how much you need to adjust your basal rate. Examples of basal adjustments based on intensity are listed below:
  - » Mild activity: 90% of your current basal rate.
  - » Moderate activity: 70 to 80% of your current basal rate.
  - » Strenuous activity: 20 to 60% of your current basal rate.

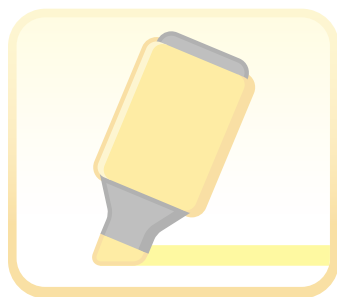


## Pump in Practice

Using a Temp Rate for exercise: A friend calls and asks you to play tennis in 15 minutes. You are ready for the challenge but haven't eaten in the last 3 hours. Before heading out the door, you check your blood glucose and it is 178 mg/dL. You decide to adjust your basal rate to 60% for the next 2 hours since you know that tennis typically drops your blood glucose. You also decide to pack a few carbohydrate snacks, a large water bottle, and your glucose meter. Now you're prepared for the match!



# Managing Physical Activity and Exercise



### Chapter Highlights

- Exercise and physical activity offer added benefits for people with diabetes. It strengthens the muscles, heart, and lungs and sharpens the mind. Exercise also increases glucose uptake and sensitizes the cells to insulin, improving blood glucose control.
- Everyone's response to physical activity is different. Plan carefully, select activities that are fun and set realistic goals for progress.
- Your t:slim Pump should typically be worn during activity, however, it may need to be removed for contact sports.
- There is an increased risk of hypoglycemia during exercise because using your muscles will enhance the body's sensitivity to insulin. Be aware of how exercise affects your blood glucose by monitoring and keeping detailed records.
- To prevent hypoglycemia, before beginning activity consider eating 15 to 30 grams of carbohydrate for every 30 to 60 minutes of strenuous activity.
- Using the Temp Rate feature on your t:slim Pump can prevent hypoglycemia during and after activity.
- Though exercise is associated with hypoglycemia, high blood glucose can result from adrenaline surges, low insulin levels, and dehydration.
- Be sure to drink plenty of fluids before, during, and after exercise.



## Checkpoint Answers

1. When and how often should you monitor your blood glucose during exercise?

*Answer:*

- *15 to 30 minutes before activity begins*
- *At start of activity*
- *During activity*
- *Following activity*

2. How many hours following an activity can exercise continue to affect your blood glucose?

*Answer: Up to 24 to 36 hours*



# Helpful Features

Exploring the features and capabilities of your t:slim Pump will help you get the most out of insulin pump therapy.

Your t:slim® Pump was designed to help you manage your diabetes by offering flexible options for customizing your basal and bolus insulin delivery; however it is equipped with much more. To enhance your pumping experience, your t:slim Pump offers additional features that will make living with diabetes more manageable and a little easier.

In this chapter, we will explore the benefits of using the following helpful features on your t:slim Pump:

- Personal Profiles
- Temporary Basal Rate
- Extended Bolus
- Quick Bolus
- Missed Meal Bolus Reminder
- Infusion Set Site Reminder
- High and Low Blood Glucose Reminders.

*Note: Always refer to your t:slim User Guide for detailed instructions on the use of these helpful features.*





Deliver 5u Bolus?

Now + Correction 3.48 u

Later 1.52 u

Duration 3:30 hrs

BACK

DELIVER



# Helpful Features



### Training Tip


Discuss your individualized insulin needs with your healthcare provider to determine if this feature is right for you.

## Additional Personal Profiles

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"><li>• A Personal Profile is a group of settings that define the basal and bolus delivery within specific time segments over a 24-hour period.</li><li>• You can create up to six different Personal Profiles with customized basal rates, carb ratios, correction factors, and target BGs. Each unique Personal Profile can be identified by a name.</li><li>• You will always have one Personal Profile active.</li></ul>	<ul style="list-style-type: none"><li>• When you have regular changes in your routine that will influence your blood glucose.</li><li>• For regular changes in weekend activity.</li><li>• To adapt to shift work.</li><li>• For scheduled exercise or activity.</li><li>• For an ongoing illness or medical treatment.</li><li>• During monthly hormonal changes.</li><li>• When testing and evaluating insulin dose settings.</li></ul>	<ul style="list-style-type: none"><li>• A Personal Profile must be programmed before it can be used (see <i>t:slim User Guide</i>).</li><li>• Once the feature has been programmed, you can activate a Personal Profile at any time.</li><li>• To change to a different profile, simply access your Personal Profiles and select the desired profile.</li></ul>

### Pump in Practice

Cal is a banker during the week and cowboy on the weekend, every weekend. Because he is very active on the ranch, Cal’s weekend insulin requirements are far less than what is needed on weekdays at the office. To avoid hypoglycemia, Cal needs to decrease his basal rate(s) and reduce his bolus delivery by making adjustments to his carb ratio, correction factor, and target BG. Cal utilizes a weekend Personal Profile on his t:slim Pump by switching to a preset “Ranch” profile every Friday night and then back to his “Office” profile on Sunday evening. Using a customized profile, he doesn’t have to constantly treat hypoglycemia or make changes to his regular “Office” profile. Now, Cal can “ride high” without worrying about a low.

 How would you use this feature?

## Temp Rate

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"> <li>The Temp Rate (temporary basal rate) feature allows you to temporarily increase or decrease your basal rate over a specified period of time.</li> <li>A basal rate can be modified for a period of 15 minutes to 72 hours at 0 to 250% of the programmed rate.</li> <li>At the end of the period, your standard basal rate will automatically resume.</li> </ul>	<ul style="list-style-type: none"> <li>Before, during, and after exercise or activity.</li> <li>During periods of stress or illness.</li> <li>During monthly hormonal changes.</li> <li>While taking certain medications.</li> <li>The time period following severe hypo or hyperglycemia.</li> <li>To assist in covering a high-fat or high-protein meal.</li> <li>For changes in normal activity, i.e. travel, outing, long conferences or meetings.</li> </ul>	<ul style="list-style-type: none"> <li>Identify a time in which a Temp Rate might be useful.</li> <li>Determine how you would like to change your standard basal delivery. An increase is shown as greater than 100%. A decrease is shown as less than 100% (<i>see t:slim User Guide</i>).</li> <li>Start with only a 10 to 20% change. Make adjustments once you begin to identify a pattern to your blood glucose responses.</li> <li>Start Temp Rate 1 to 2 hours before the activity or event begins. End Temp Rate 1 to 2 hours after activity or event ends.</li> <li>Record any changes for future reference.</li> </ul>

### Pump in Practice

Maria is going on a family road trip to vacation at the beach. Usually, she is very active and busy during the day. Having to sit in the car for 9 hours is very different from her normal daily routine. She is concerned that this prolonged inactivity will cause an increase in her blood glucose. Maria knows she will need more basal insulin while traveling. She decides to increase her basal rate by setting a Temp Rate on her t:slim Pump at 110% for the next 9 hours. Thanks to the increase in her insulin delivery, Maria is able to keep her blood glucose at her target goal throughout the trip. Her vacation is off to a great start!



How would you use this feature?

# Helpful Features



## Checkpoint

When using the Extended Bolus feature, which part of the bolus can you DELIVER LATER?

Answer



## Training Tip


You might find that different distributions of immediate delivery and extended delivery boluses work for different foods.

## Extended Bolus

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"><li>• The Extended Bolus feature offers the option of delivering all or a portion of your food bolus over an extended period of time.</li><li>• You determine the percentage of the food bolus that you want delivered immediately and how much you want delivered over time.</li><li>• An extended bolus can be delivered for a period of 15 minutes to 8 hours.</li></ul>	<ul style="list-style-type: none"><li>• When you want a slow infusion of your insulin bolus over time.</li><li>• When you eat a high-protein and/or high-fat meal (i.e., steak or pizza).</li><li>• When you eat a large meal.</li><li>• When eating over an extended period of time like a banquet or party.</li><li>• If you suffer from slow digestion or have gastroparesis.</li><li>• If you decide that you do not want to eat the entire meal, you can cancel the bolus before it is delivered.</li><li>• For medications that affect your digestion.</li></ul>	<ul style="list-style-type: none"><li>• When delivering a bolus, select Extended after entering grams of carb or units of insulin and before selecting Deliver (see <i>t:slim User Guide</i>).</li><li>• Your t:slim Pump will calculate and display 50% DELIVER NOW. You can confirm this amount or change the percentage of the amount for the food bolus you would like to DELIVER NOW.</li><li>• Your t:slim Pump will then calculate the amount to DELIVER LATER (extended).</li><li>• Finally, you will be prompted to select the duration of time that the extended portion will be delivered.</li></ul>

## Pump in Practice

Lorenzo loves his wife’s homemade lasagna. He knows that for every 4-inch square he plans to eat, he will enter 40 grams of carb into his t:slim Pump and bolus accordingly. Because of the high amount of cheese (fat and protein) in the lasagna, the carbohydrate from the pasta is released into his bloodstream at a slower rate. As a result, Lorenzo’s blood glucose drops shortly after the meal and later increases, remaining elevated well into the night. Now, Lorenzo uses the Extended Bolus feature on his t:slim Pump for lasagna. He delivers 40% of the food bolus NOW and extends the remaining 60% over the next 4 hours. His wife’s lasagna never tasted better!

 How would you use this feature?

# Quick Bolus

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"><li>• A secondary way to deliver a bolus by following beep or vibration commands without navigating through or viewing your t:slim Pump screen.</li><li>• This feature is programmed to deliver a bolus by entering increments of units of insulin or grams of carbohydrate.</li><li>• The Quick Bolus feature does NOT allow you to enter a blood glucose value to calculate a correction bolus.</li></ul>	<ul style="list-style-type: none"><li>• When you want to deliver a bolus discreetly, without your insulin pump in view.</li><li>• When you have already calculated your insulin needs and just want to quickly deliver a bolus.</li><li>• When your t:slim Pump is not worn in an easily accessible place.</li><li>• If you are visually impaired or unable to read the screen.</li></ul>	<ul style="list-style-type: none"><li>• The Quick Bolus feature must be turned on and programmed before using (see <i>t:slim User Guide</i>).</li><li>• Once the feature has been programmed, simply press and hold the Quick Bolus button to activate the function.</li><li>• Next, press the button for each increment until the desired amount is reached.</li><li>• Wait for the confirmation feedback and then press the Quick Bolus button again to deliver.</li></ul>



## t:slim Tip

When first using the Quick Bolus feature, practice by viewing the screen until you become familiar with the process.

## Pump in Practice

Lara is busy at a working lunch meeting. She wants to eat a half of a bagel, but does not want to remove her t:slim Pump from under her clothing to navigate delivering a bolus. Lara can easily access the Quick Bolus button through her clothing. By following vibration commands, she can accurately enter the 30 grams needed to cover the bagel into her t:slim Pump without disrupting the meeting or bringing attention to herself.



How would you use this feature?

# Helpful Features


## Missed Meal Reminder

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"><li>• The Missed Meal Bolus Reminder offers the option of programming a personalized alert that will notify you of a possible missed meal bolus.</li><li>• If a bolus is not delivered during that time period, your t:slim Pump will alert, reminding you that a possible missed meal bolus has occurred.</li></ul>	<ul style="list-style-type: none"><li>• If you frequently forget to bolus for a meal.</li><li>• When life gets busy and you simply forget to bolus for a meal or a snack.</li><li>• To minimize the risk of high blood glucose following a meal.</li></ul>	<ul style="list-style-type: none"><li>• The Missed Meal Bolus Reminder must be turned on before using (<i>see t:slim User Guide</i>).</li><li>• To program, select the day(s) of the week and the time frame (starting and ending) that you would like to be reminded.</li><li>• Your t:slim Pump will alert you at the end of the time frame if no bolus has been delivered.</li></ul>

### Pump in Practice

Will is usually home from school around 3 pm every day. He typically eats a snack, but often forgets to bolus for that snack because he quickly gets busy with homework and other projects.

To avoid the resulting high blood glucose from a missed bolus, Will sets a Missed Meal Bolus Alert from 3 to 4 pm every day. If he forgets to bolus by 4 pm, his t:slim Pump will alert to remind him of a possible Missed Meal Bolus. Now, Will no longer struggles with high blood glucose before dinner.

 How would you use this feature?



## Site Reminder

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"> <li>The Site Reminder is a programmable setting that reminds you when it is time to change your infusion set.</li> <li>You can select the time and date that you would like your t:slim Pump to remind you to change your infusion set.</li> <li>Keep in mind, there may be times you will need to change the infusion set before the reminder alerts.</li> </ul>	<ul style="list-style-type: none"> <li>To remind you to change your infusion set every 2 to 3 days.</li> <li>As a safety measure, to reduce the risk of developing a site infection.</li> <li>As a safety measure to maintain insulin stability and absorption.</li> </ul>	<ul style="list-style-type: none"> <li>The Site Reminder must be turned on before use (<i>see t:slim User Guide</i>).</li> <li>This feature can be accessed and programmed from the Load Menu.</li> <li>In the load menu, select Site Reminder 'on'. Select 'Edit Reminder', then select the number of days and the time that you would like to be reminded to change your infusion set.</li> </ul>



### Checkpoint

Before using the Reminders in your t:slim Pump, they must be turned on and programmed.

TRUE or FALSE

## Pump in Practice

Sam works shifts. Alternating days and nights, it's easy to forget the day of the week, much less when to change his infusion set. Life is busy at home as well. Sam often forgets to change his infusion set and notices high blood glucose or irritation at his site after 3 days of use. His diabetes management is in poor control.

Sam sets the Site Reminder in his t:slim Pump to alert him when it is time to change his infusion set. Now, he never forgets to change his infusion set and avoids the problems he had in the past. His blood glucose control is looking much better.



How would you use this feature?

# Helpful Features



### Training Tip


Discuss your individualized insulin needs with your healthcare provider to determine if this feature is right for you.

## High and Low Blood Glucose Reminders

What is it?	Why use it?	How do I use it?
<ul style="list-style-type: none"><li>• Blood Glucose Reminders can be set to remind you to monitor your blood glucose within a specific time following a high or low blood glucose event.</li><li>• A Low Blood Glucose Reminder can be set to alert in 10 to 20 minutes.</li><li>• A High Blood Glucose Reminder can be set to alert in 1 to 3 hours.</li></ul>	<ul style="list-style-type: none"><li>• As a safety measure to ensure that blood glucose is returning to normal.</li><li>• When new to pumping.</li><li>• To determine if you need to re-treat a low blood glucose reaction with fast-acting carb or re-treat a high blood glucose with a correction dose.</li><li>• To troubleshoot high or low blood glucose.</li></ul>	<ul style="list-style-type: none"><li>• The Blood Glucose Reminder feature must be turned on and programmed before using (<i>see t:slim User Guide</i>).</li><li>• Once the feature has been programmed, it will automatically alert you to monitor your blood glucose at the set time period.</li></ul>

### Pump in Practice

Ali is following-up with her diabetes educator today. At her last visit, it was found that her A1C had risen 1.2 percentage points over the last 3 months. Ali’s blood glucose logs revealed that she often did not recheck her blood glucose following a high event. At that time, Ali’s diabetes educator suggested that she utilize the High Blood Glucose Reminder in her t:slim Pump. She set the reminder to alert 1 hour following a blood glucose of greater than 200 mg/dL. Good news today! Ali’s A1C has returned to a healthy A1C goal.

 How would you use this feature?



Match each case scenario with the t:slim Pump feature that you feel would be the best choice.



1. You develop a fever and your blood glucose is difficult to control.



2. You have a hard time keeping track of your last infusion set change.



3. Your t:slim Pump is hidden in your formal wear and it is time to eat dinner.



4. You often work through lunch and find that you frequently forget your meal bolus.



5. You are at a friend's house "grazing" on pizza and other high-fat food.



6. You are new to pumping. You just checked your blood glucose and it is 276 mg/dL. It is time for bed.



7. You are planning a 5-day hiking and camping trip and are concerned that the activity will cause your blood glucose to drop.

A. Site Change Reminder

B. Temp Rate

C. Personal Profiles

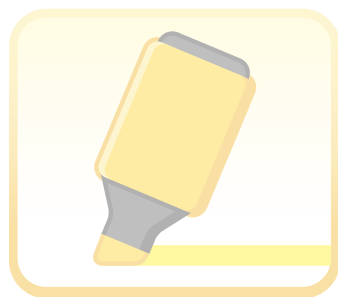
D. Extended Bolus

E. High Blood Glucose Reminder

F. Missed Meal Bolus Reminder

G. Quick Bolus

# Helpful Features



## Chapter Highlights

- Your t:slim Pump is equipped with a variety of helpful, easy-to-use features that make managing your diabetes a little simpler.
- Personal Profiles define your insulin delivery and insulin dose settings. You can program up to six easily accessible profiles customized by settings and personalized by names.
- A Temp Rate allows you to increase or decrease your basal delivery short-term, from 15 minutes to 72 hours.
- The Extended Bolus feature offers the option of slowing down the release of a meal bolus to better match insulin to foods that are harder to digest or when eating over an extended period.
- The Quick Bolus is another way to deliver a bolus without navigating through or viewing the screen.
- The Missed Meal Bolus Reminder alerts you when a meal bolus was not delivered during a specified period of time.
- The Site Reminder keeps track of your last infusion set change. It can be programmed to remind you to change your infusion site by day and time of day.
- The High and Low Blood Glucose Reminders can be set to remind you to re-check your blood glucose within a specified time following a high or low blood glucose event.



## Checkpoint Answers

1. When using the Extended Bolus feature, which part of the bolus can you DELIVER LATER?  
*Answer: Food bolus*
2. Before using the Reminders in your t:slim Pump, they must be turned on and programmed.  
*Answer: True*



## Activity Answer Key – Match Each Case Scenario

1. You develop a fever and your blood glucose is difficult to control.  
*Answer: (B) Temp Rate*
2. You have a hard time keeping track of your last infusion set change.  
*Answer: (A) Site Change Reminder*
3. Your t:slim Pump is hidden in your formal wear and it is time to eat dinner.  
*Answer: (G) Quick Bolus*
4. You often work through lunch and find that you frequently forget your meal bolus.  
*Answer: (F) Missed Meal Bolus Reminder*
5. You are at a friend's house "grazing" on pizza and other high-fat food.  
*Answer: (D) Extended Bolus*
6. You are new to pumping. You just checked your blood glucose and it is 276 mg/dL. It is time for bed.  
*Answer: (E) High Blood Glucose Reminder*
7. You are planning a 5-day hiking and camping trip and are concerned that the activity will cause your blood glucose to drop.  
*Answer: (C) Personal Profiles*

# Evaluating and Fine-Tuning Your Insulin Dose Settings

Evaluating your insulin dose settings over time will help to ensure your efforts are successful.

So far, you have learned some key information and tips to help you set up your t:slim® Pump, deliver boluses, and troubleshoot. You have also explored helpful features on your t:slim Pump. Your healthcare provider has calculated your basal rates, carb ratios, and correction factors based on your previous insulin dosing and medical history. These settings will likely change based on your experience and personalized needs. Over time, you and your healthcare provider will dig a little deeper to determine if these settings are right for you.

Fine-tuning your insulin dose settings is a process that may take some time. It involves testing and evaluating your basal and bolus settings to determine if changes are needed. This is an ongoing process. You will also need to re-evaluate these settings from time to time, especially when your blood glucose is not responding as it should.

In this chapter, we will review the following methods to assist in fine-tuning your insulin dose settings:

- PIE format process for fine-tuning your basal and bolus settings
- Using continuous glucose monitoring
- Using blood glucose pattern management





# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Training Tip

These are general guidelines. Consult your healthcare provider for specific recommendations and before making any changes to your current insulin dose settings.

### Using the PIE Format (Prepare, Investigate, Evaluate)

The PIE format is a three-step process designed to help guide you through testing and fine-tuning your insulin dose settings. Below is a broad overview; more detailed step-by-step guidelines will follow.



### Prepare:

Before testing – It is necessary to know how to manage your food intake and blood glucose to prepare for testing. This represents the preparation period before the actual testing begins.

### Investigate:

During testing – When you are ready to proceed, you will need to monitor and record your blood glucose. This represents the actual testing period.

### Evaluate:

After testing – Once testing is completed, you will analyze the results in order to determine if changes to your current insulin dose settings are needed. This represents the evaluation period.

It is often a challenge to identify which insulin dose setting needs to be adjusted. For instance, you might assume that your basal rate is too low because you run high in the late afternoon. However, further investigation may prove that your basal settings are just fine, but your carb ratio or correction factor is not adequate. Evaluating these settings involves a “process of elimination.” Basal testing is a good place to start.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Checkpoint

What are the three steps for testing and fine-tuning your insulin dose settings?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

## Fine-Tuning Your Basal Rates

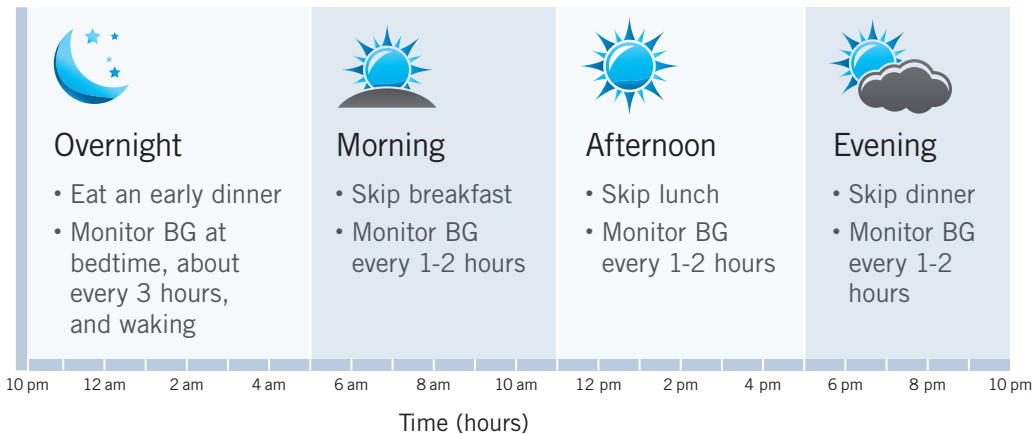
When basal rates are fine-tuned, blood glucose should remain relatively stable overnight and in between meals, even if you skip a meal. You have likely started pumping with only one or two basal settings. People using insulin pumps often find that having three to five basal rate changes throughout a 24-hour period helps them achieve their blood glucose goals. In order to determine if changes are needed or whether you would benefit from having multiple basal rate settings, you will need to start by testing your current basal rates.

For your convenience, the 24-hour basal testing will be divided into four basal testing periods. Each period should be tested individually, and then repeated to identify trends.

## Basal Testing Periods

The goal is to measure changes in your blood glucose while receiving basal insulin only. This requires that all food from a prior meal or snack and insulin from previous boluses have cleared your body. Each of the four basal testing periods shown below includes a 4 to 6 hour testing period: overnight, morning, afternoon, and evening.

### Basal Testing Periods



## General Guidelines for Basal Rate Testing

- Do not disconnect from your t:slim Pump, stop insulin delivery, or run a Temp Rate while testing.
- Do not attempt to test more than one basal period at a time. Allow 2 to 3 days between each basal testing period.
- Repeat basal testing 2 to 3 times for each period in order to identify a trend. To make this fit into your schedule, testing periods can be alternated when repeated.
- Basal testing does not have to be performed in any specific order. However, many find it helpful to test, evaluate, and adjust overnight basal rates first.
- Avoid basal testing:
  - » Within 12 hours of a severe low blood glucose event
  - » If you are ill or under stress
  - » Following strenuous activity or exercise
  - » If you have consumed alcohol within the last 24 hours
- Do not eat during a test. Drink only water or decaffeinated sugar-free beverages.



### Checkpoint

What are the four basal testing periods?

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

Notes: \_\_\_\_\_

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\_\_\_\_\_

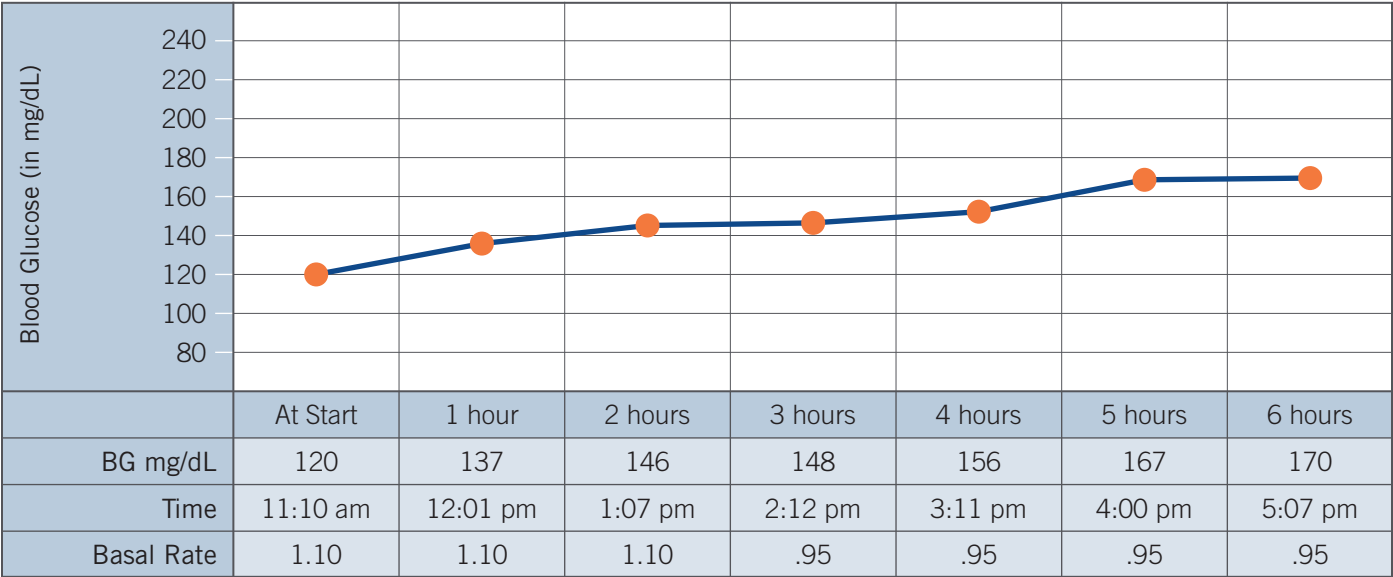
\_\_\_\_\_

# Evaluating and Fine-Tuning Your Insulin Dose Settings

## PIE Format for Basal Testing

Prepare	Investigate	Evaluate
<ul style="list-style-type: none"><li>• Select a basal testing period.</li><li>• Plan to skip the meal within that period.</li><li>• Wait 4 to 5 hours after eating last meal or snack before testing begins.</li><li>• Allow 4 to 5 hours after last bolus before testing begins.</li><li>• Check t:slim Pump to ensure there is no IOB present at start of test.</li></ul>	<ul style="list-style-type: none"><li>• Monitor BG at start of test and record.</li><li>• DO NOT START TEST if BG is below 90 mg/dL or above 150 mg/dL. Treat and resume testing on another day.</li><li>• DURING TESTING, if BG falls below 70 mg/dL or rises above 250 mg/dL, discontinue testing. Treat and resume testing on another day.</li><li>• For daytime testing, monitor BG every 1 to 2 hours and record.</li><li>• For overnight testing, monitor BG at bedtime, 2 am, and waking. Record results.</li><li>• Do not eat while testing.</li></ul>	<ul style="list-style-type: none"><li>• Do not make any adjustments to your basal rates before reviewing results with your healthcare provider.</li><li>• BG fluctuations of more than 30 mg/dL may indicate a need for adjustment.</li><li>• Any adjustments should be small, starting with a 5% to 10% change.</li><li>• When adjusting basal rates, make changes before your BG starts to trend up or down. It may take 2 ½ to 4 hours for a basal rate change to lead to a steady level. Discuss specific guidelines with your healthcare provider.</li><li>• Anytime adjustments to basal rates are made, monitor BG frequently to assess how well these changes are working.</li></ul>

## Sample Basal Rate Testing Log





## Fine-Tuning Your Bolus Dose Settings

Once your 24-hour basal rates have been tested, evaluated, and fine-tuned, you can move forward with testing your carb ratio and correction factor.

### General Guidelines for Bolus Dose Testing

- Do not disconnect from your t:slim Pump, stop insulin delivery, run a temp rate, or deliver an extended bolus while testing.
- Repeat testing 2 to 3 times. Try to identify a trend.
- Avoid testing:
  - » Within 12 hours of a severe low blood glucose event.
  - » If you are ill or under stress.
  - » Following strenuous activity or exercise.
  - » If you have consumed alcohol within the last 24 hours.
- Do not eat while testing. Drink only water or decaffeinated sugar-free beverages.



### Checkpoint

You may need to adjust your basal rates if BG fluctuates more than \_\_\_\_\_ mg/dL while testing.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Training Tip

Carb ratios may vary from meal to meal. Plan to evaluate all meals to determine if there is a need for a variety of settings. Do not test more than one meal per day.



### Training Tip

As insulin needs change throughout the day, your bolus dose settings may need to change as well. Testing and evaluating your carb ratio and correction factor at different times of the day will help you determine whether you need a range of bolus dose settings.

## Carb Ratios

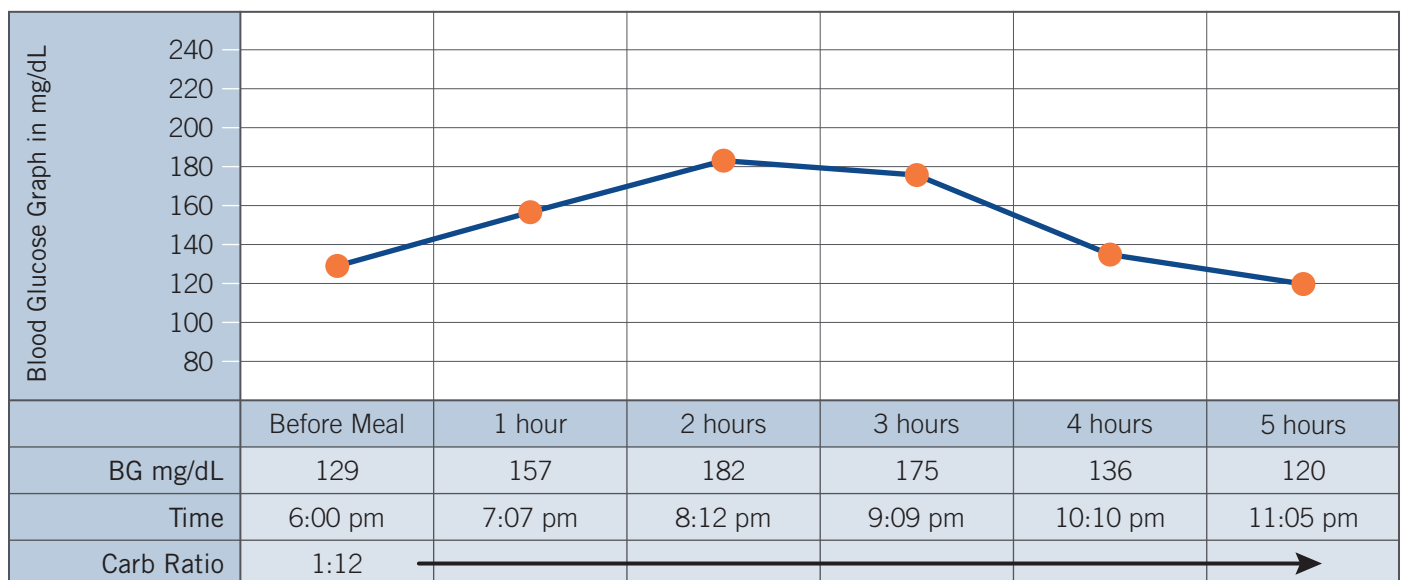
Carb ratios are different for everyone. They may also vary from meal to meal or even with the type of food you eat. You will typically start with one carb ratio and later determine if there is a need to set more. If your carb ratio is accurately set, your blood glucose should return to within 30 mg/dL of your pre-meal blood glucose 4 to 5 hours after eating.



## PIE Format for Testing Your Carb Ratio

Prepare	Investigate	Evaluate
<ul style="list-style-type: none"> <li>Plan to eat a meal with a balance of carb, protein, and fat. Ensure that the carb content is known and between 45 to 75 g.</li> <li>Wait 4 to 5 hours after eating your last meal or snack before testing begins.</li> <li>Allow 4 to 5 hours after last bolus before testing begins.</li> <li>Check your t:slim Pump to ensure there is no IOB present at start of test.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor BG at start of test and record.</li> <li>DO NOT START TEST if BG is below 90 mg/dL or above 150 mg/dL.</li> <li>Bolus by entering the total carb for the entire meal into your t:slim Pump. DO NOT ENTER A BG.</li> <li>Eat your meal within 15 minutes after the bolus. Do not eat anything new during this testing period.</li> <li>Monitor BG every hour and record.</li> <li>During testing, if BG falls below 70 mg/dL or rises above 250 mg/dL, discontinue testing. Treat and resume testing on another day.</li> </ul>	<ul style="list-style-type: none"> <li>Do not make any adjustments to your carb ratio before reviewing the results with your healthcare provider.</li> <li>Your BG should return to within 30 mg/dL of your starting BG after 4 to 5 hours.</li> <li>If your BG is lower than 30 mg/dL of your starting BG, increase your carb ratio to decrease your carb bolus. Retest later. For example, if ratio is 1:10, try 1:11 or 1:12.</li> <li>If your BG is higher than 30 mg/dL of your starting BG, decrease your carb ratio to increase the carb bolus. Retest later. For example, if ratio is 1:10, try 1:9 or 1:8.</li> </ul>

## Sample Carb Ratio Testing Log



# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Training Tip

Correction factors may vary by time of day. Plan to evaluate your correction factor at different times of the day. Do not test more than one time period at a time.



### Training Tip

Plot your course using the carb ratio and correction factor logs found in Appendix B. Make photocopies for future use. Share results with your healthcare provider.

## Correction Factor

The correction factor represents your sensitivity to insulin and varies from person to person. It can be affected by hormonal changes, exercise, activity, and even time of day.

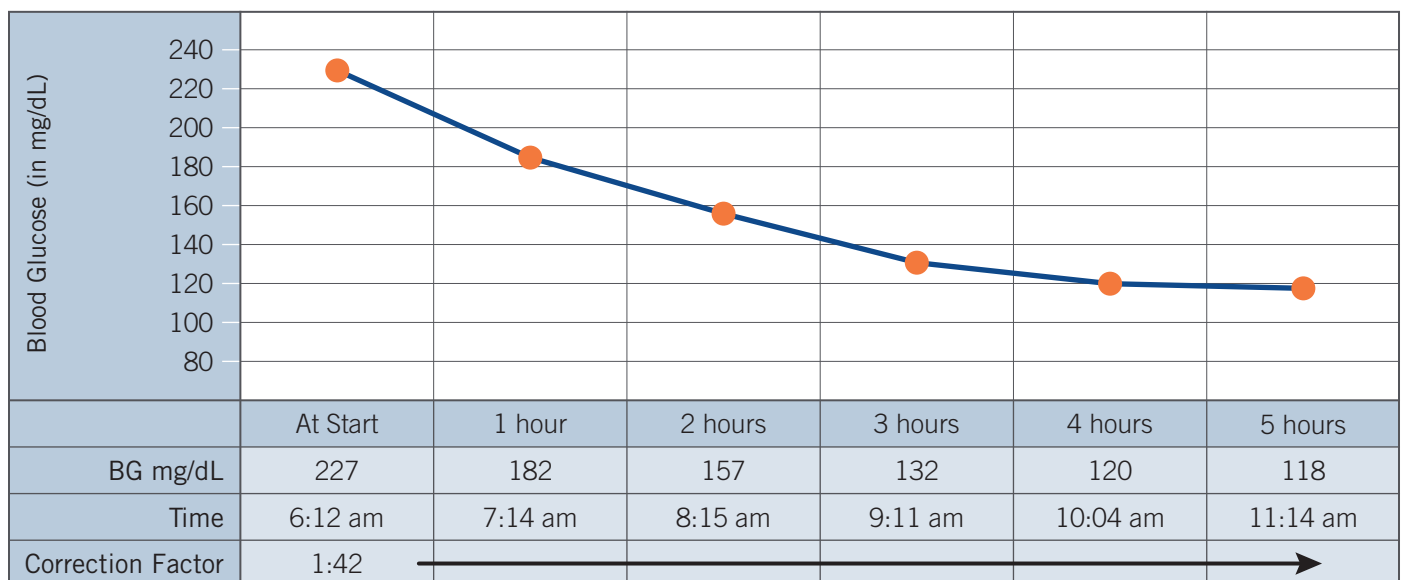
Finding an opportunity to test your correction factor may present more of a challenge than testing your carb ratio. You will need to identify a time when your blood glucose is greater than 200 mg/dL and you have not eaten or delivered a bolus within the last 4 hours. For this reason, a correction factor test cannot be set up. The testing involves correcting for high blood glucose and then evaluating its effectiveness at lowering your blood glucose.



## PIE Format for Testing Your Correction Factor

Prepare	Investigate	Evaluate
<ul style="list-style-type: none"> <li>Identify your target BG.</li> <li>Wait 4 to 5 hours after eating your last meal or snack before testing begins.</li> <li>Allow 4 to 5 hours after last bolus before testing begins.</li> <li>Check your t:slim Pump to ensure there is no IOB present at start of test.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor BG at start of test and record.</li> <li>AT START OF TEST, BG must be over 200 mg/dL. If BG is &gt;250 mg/dL with positive ketones, discontinue testing. Treat and resume testing on another day.</li> <li>Bolus. Enter your current BG into your t:slim Pump and bolus the calculated amount.</li> <li>Monitor BG every hour and record.</li> <li>Do not eat while testing.</li> <li>DURING TESTING, if BG is &lt;70 mg/dL or &gt;250 mg/dL with positive ketones, discontinue testing. Treat and resume testing on another day.</li> </ul>	<ul style="list-style-type: none"> <li>Do not make any adjustments to your correction factor before reviewing the results with your healthcare provider.</li> <li>Your BG should return to within 30 mg/dL of your target BG after 4 to 5 hours.</li> <li>If your BG is lower than 30 mg/dL of your target BG, increase your correction factor to decrease the correction bolus and retest later. For example, if ratio is 1:50, try 1:55 or 1:58.</li> <li>If your BG is higher than 30 mg/dL of your target BG, decrease your correction factor to increase the correction bolus and retest later. For example, if ratio is 1:50, try 1:45 or 1:42.</li> </ul>

## Sample Correction Factor Testing Log



# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Checkpoint

Under what circumstances should you immediately discontinue basal or bolus dose testing?

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Answer

### Insulin Duration

The insulin duration setting in your t:slim Pump has a direct effect on the correction bolus calculation. It reflects the amount of time a food or correction bolus is actively lowering your blood glucose. An accurate insulin duration setting prevents insulin stacking, improves bolus accuracy, and reveals the insulin on board (IOB) remaining from previous boluses. The insulin duration setting in your t:slim Pump was originally determined by your healthcare provider. Work with your healthcare provider to evaluate and determine if the current setting is right for you.

### Continuous Glucose Monitoring

Continuous Glucose Monitoring (CGM) assists in the process of fine-tuning and evaluating your insulin dose settings by providing immediate access to continuous blood glucose readings, rather than hourly readings. CGMs are equipped with alarms and alerts that notify you of rapid changes in your blood glucose. This can be especially useful when evaluating blood glucose trends. Talk with your healthcare provider to find out more about CGM.

### Electronic Data Management Systems

t:connect® is a visual resource to help you identify and learn more about your blood glucose trends and patterns. With regular data uploads, you can easily uncover meaningful insights and trends that will help you see the impact of

insulin delivery on your blood glucose. These reports are designed to be used at home and shared with your healthcare provider during routine visits.



t:connect® Application Dashboard



## Pattern Management

You might find that even though your basal rates and bolus dose settings have been evaluated and fine-tuned, you continue to experience some unexplained highs or lows.

So much of the time, diabetes management focuses on what action to take now. However, it is equally important to take a step back and periodically look at the “bigger picture” to evaluate the impact that insulin and lifestyle have on your blood glucose. This is where pattern management can help.

Pattern management is an approach to help you identify patterns and trends by reviewing and analyzing blood glucose results over a period of time. For example, certain foods or meals may require the use of an extended bolus, or you may find that setting up a new Personal Profile would be beneficial when traveling. Taking the time to analyze patterns will provide information to help you determine whether changes in your insulin dosing and/or lifestyle are needed. Your healthcare provider can use this information to suggest strategies to help you manage any issues that you might uncover.

Some patterns will be relatively easy to find. For example, a low blood glucose reaction often awakens you in the night. Other patterns may be more difficult to detect. For instance, shortly after eating pizza last night, your blood glucose is 72 mg/dL. Even though you treat your low blood glucose as usual with 15 grams of carbohydrate, several hours later it is 300 mg/dL. Thinking back, you recognize that this is a pattern that often occurs after eating pizza and needs more investigation. In either case, there are steps you should take to help identify and manage blood glucose patterns.

# Evaluating and Fine-Tuning Your Insulin Dose Settings

## Steps for Successful Pattern Management

### Monitor BG

- Frequently
- At different times of the day
- At times you would not normally check
- When you have changes in your routine, food intake, or activity level
- When you are ill or under stress

### Keep Records

- Keep a diary or record for several days
- Record time and date of each entry
- Keep records by hand (written or on your computer), and/or use the t:slim Pump history, reports from the t:connect® Diabetes Management Application, CGM, or meter download software
- What to record
  - » BG
  - » What you eat
  - » Insulin boluses
  - » Ketone results
  - » Use of temp rate or extended bolus
  - » Activities (what, when, how long)
  - » Other lifestyle or behavior factors like stress, hormonal changes, illness, infusion set and insulin changes, and dining out

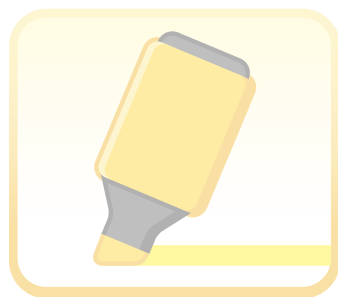
## Identify Patterns

Schedule some time to review your records. Look for patterns of high and low BGs. Ask yourself the following questions:

- Do I have patterns related to my activities, food intake, insulin doses, or lifestyle behaviors?
- Have I evaluated and fine-tuned my insulin dose settings?
- Are my insulin dose settings accurate for the time frames in which patterns have been identified?

The answers to these questions can help you better understand how life influences can affect your blood glucose. Share these results with your healthcare provider to identify patterns, determine the cause, and find possible solutions that will benefit your diabetes management.

# Evaluating and Fine-Tuning Your Insulin Dose Settings



### Chapter Highlights

- Work with your healthcare provider to evaluate and adjust your insulin dose settings in order to meet your specific needs. They include: basal rates, carb ratios, and corrections factors.
- Evaluating and fine-tuning your insulin dose settings is a process that takes time and preparation.
- The PIE format for evaluating insulin dose settings is a three-step process that involves the following steps: Prepare, Investigate, Evaluate.
- Begin by evaluating your 24-hour basal settings in four periods; overnight, morning, daytime, and evening.
- Your blood glucose should remain relatively stable in the absence of food. Adjustments to your basal rates may be needed if you experience fluctuations of more than 30 mg/dL during testing.
- After you have reviewed the results with your healthcare provider and made any adjustments, repeat testing.
- Once basal testing is completed, you can move forward and test your carb ratio and correction factor.
- When carb ratios are set accurately, your blood glucose should return to within 30 mg/dL of your starting blood glucose in 4 to 5 hours after eating.
- When your correction factor is set accurately, your blood glucose should return to your target within 4 to 5 hours after correcting a high blood glucose.
- Any adjustments to your basal or bolus settings should be small, starting with a 5–10% change. Discuss all changes with your healthcare provider.
- Discuss any changes to your insulin dose settings with your healthcare provider.
- Pattern management is an approach to help you identify patterns and trends by reviewing and analyzing the impact of insulin delivery and lifestyle/behavior on blood glucose results over a period of time.



## Checkpoint Answers

1. What are the three steps for testing and fine-tuning your insulin dose settings?

*Answer:*

- *Prepare*
- *Investigate*
- *Evaluate*

2. What are the four basal testing periods?

*Answer:*

- *Overnight*
- *Morning*
- *Afternoon*
- *Evening*

3. You may need to adjust your basal rates if BG fluctuates more than \_\_\_\_\_ mg/dL while testing.

*Answer: 30 mg/dL*

4. Under what circumstances should you immediately discontinue basal or bolus dose testing?

*Answer: BG falls below 70 mg/dL or rises above 250 mg/dL during testing*

# Planning for Success

Change involves learning new behaviors to help you form healthy new habits.

We hope the t:slim Guide for Successful Pumping has helped you to feel at ease with your new t:slim® Insulin Pump. Now it's time to think about the expectations you had before you began pumping insulin. Do you feel you are on the right track to meeting them? This final chapter is designed to help you meet these expectations by providing goal setting strategies that will enhance your insulin pumping experience.





# Planning for Success



## Setting Realistic Goals

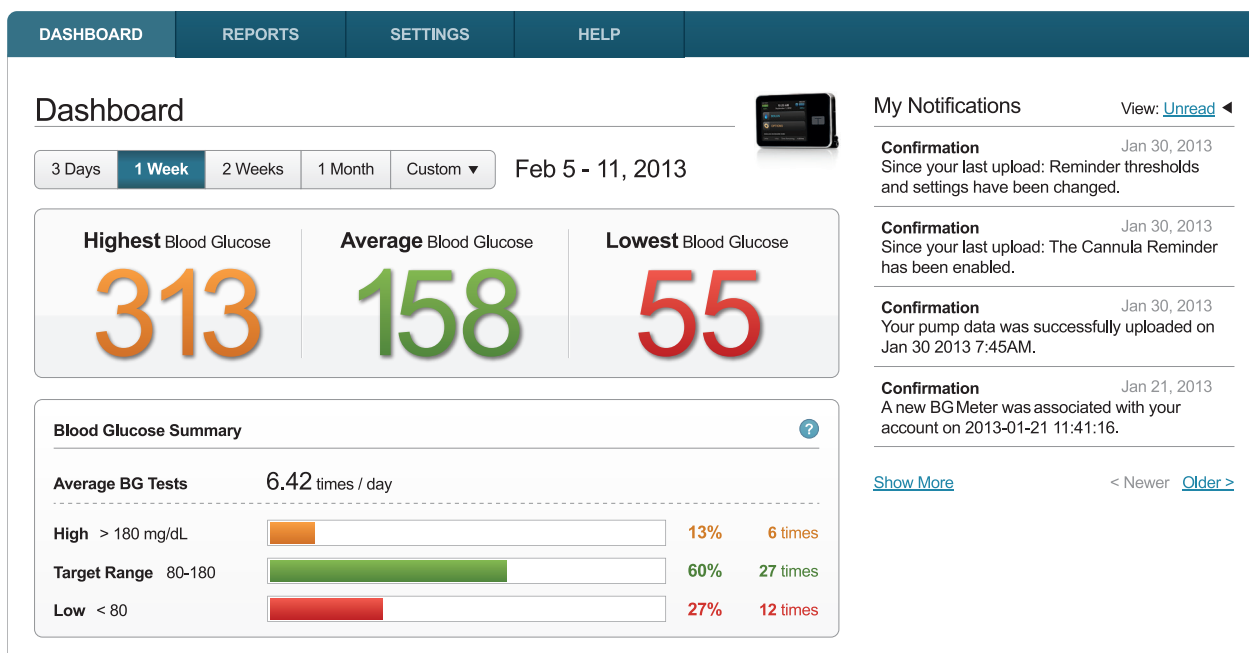
Goal setting is a successful tool often used for making positive lifestyle changes. When you set goals, you are challenging yourself to make improvements. With this in mind, it is very important to try and keep your goals realistic and measurable.

**Short-Term Goals** can be achieved in the near future, perhaps as short as one day, a week, or a few months. Some examples of short-term goals would be to monitor and record your blood glucose at least four times per day, count your carbs at every meal and snack, or exercise three to four times per week.

**Long-Term Goals** focus on a longer period of time; several months, a year and up. Some examples of long-term goals would be to train for a half marathon or improve your hemoglobin A1C by two percentage points in 6 months.

Think about what motivates you to be healthy, the steps you will take to get there, and the barriers that may get in your way. Most of us know what we should do to stay healthy. So, if we know this, what prevents us from doing it? The exercises in this chapter will help you reflect on the answer, which in turn may help you to create new, positive habits.

Using the activity boxes, identify short-term and a long-term diabetes management goals that you would like to achieve. Discuss with your healthcare provider what goals are right for you. Let's begin with your short-term goal.



## My Short-Term Goal



What short-term diabetes management goal would I like to achieve within the next month?

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What steps will I take to achieve this short-term goal?

1. 

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2. 

---
3. 

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Why is this short-term goal important to me?

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What may prevent me from reaching this short-term goal?

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# Planning for Success

...my short-term goal continued



What can I do to prevent this from happening?  
How can I overcome this barrier?

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---



On a scale of 1 to 5, how *CONFIDENT* am I that I will reach this goal?  
*Confidence Rating (1 = Not Confident, 5 = Very Confident)*

Circle one:    1    2    3    4    5

If 1, 2, or 3 are circled, how can I increase my confidence in reaching this goal?

---

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On a scale of 1 to 5, how *READY* am I to start working toward this goal?  
*Readiness Rating (1 = Not Ready, 5 = Very Ready)*

Circle one:    1    2    3    4    5

If 1, 2, or 3 are circled, how can I increase my readiness to start working toward this goal?

---

---

## My Long-Term Goal



What Long-Term Diabetes Management Goal Would I Like To Achieve Over The Next 6 Months?

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What Steps Will I Take To Achieve This Long-Term Goal?

1. 

---
2. 

---
3. 

---



Why Is This Long-Term Goal Important To Me?

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---



What May Prevent Me From Reaching This Long-Term Goal?

---

---

# Planning for Success

...my long-term goal continued



What Can I Do To Prevent This From Happening?  
How Can I Overcome This Barrier?

---

---



On a scale of 1 to 5, how *CONFIDENT* am I that I will reach this goal?  
*Confidence Rating (1 = Not Confident, 5 = Very Confident)*

Circle one:    1    2    3    4    5

If 1, 2, or 3 are circled, how can I increase my confidence in reaching this goal?

---

---



On a scale of 1 to 5, how *READY* am I to start working toward this goal?  
*Readiness Rating (1 = Not Ready, 5 = Very Ready)*

Circle one:    1    2    3    4    5

If 1, 2, or 3 are circled, how can I increase my readiness to start working toward this goal?

---

---



## Forming a Support Team

When you are making changes and working toward a goal, it is helpful to have a support team. Friends, family, and your healthcare provider are there to provide support and keep you on track. Your support team can give you advice, be a rock to lean on, or simply be your cheerleader.

In addition, it can be even more beneficial to include others living with diabetes on your support team. They will be able to relate to you by understanding your journey and providing encouragement. Talking with others living with diabetes, either individually or in a group setting, will help you realize that you're not alone. Refer to the nonprofit organizations listed in Appendix D or contact your healthcare provider for a list of local support groups or diabetes organizations.

Be sure to share your goals with your support team. Let them know that you may reach out to them from time to time so that they can help keep you on track. You may find that reminders and gentle nudges from your support team can reinforce your confidence.



My support team – listed below are the names and contact numbers of “my support team.”

Name: \_\_\_\_\_ Contact Number: \_\_\_\_\_

Why I chose this person to be on my team: \_\_\_\_\_  
\_\_\_\_\_

Name: \_\_\_\_\_ Contact Number: \_\_\_\_\_

Why I chose this person to be on my team: \_\_\_\_\_  
\_\_\_\_\_

Name: \_\_\_\_\_ Contact Number: \_\_\_\_\_

Why I chose this person to be on my team: \_\_\_\_\_  
\_\_\_\_\_

# Quick Reference Guides

Diabetes management and insulin pump therapy may seem overwhelming at times. Eventually, it will become second nature. Even still, life may throw you a curveball. Having a plan will keep you prepared and help reduce anxiety when the unexpected happens.

An inventory of diabetes supplies and treatment guidelines for high and low blood glucose were provided in previous chapters. This section is designed to make these references easily accessible to you in one location. You will also find quick reference guidelines for how to handle time-off of your t:slim Pump. Remember to always discuss your individualized insulin needs with your healthcare provider.

## Supplies to Carry and Keep on Hand

Carry Every Day	Keep at Home	When Traveling
<ul style="list-style-type: none"> <li>• Blood glucose testing supplies: meter, strips, lancets, meter batteries</li> <li>• Fast-acting carbohydrate for low blood glucose</li> <li>• Extra snack for longer coverage than fast-acting carbohydrate</li> <li>• Glucagon emergency kit (for recurrent, severe hypoglycemia)</li> <li>• Rapid-acting insulin and syringes</li> <li>• Infusion sets (a minimum of two)</li> <li>• Insulin pump cartridges (a minimum of two)</li> <li>• Infusion site preparation products (antiseptic wipes, skin adhesive)</li> <li>• Ketone testing strips</li> <li>• t:slim Wallet Card (for troubleshooting tips and t:slim Pump dose settings)</li> <li>• Diabetes identification card or jewelry</li> <li>• t:slim Pump USB cable</li> </ul>	<ul style="list-style-type: none"> <li>• Blood glucose testing supplies: meter, strips, lancets, meter batteries</li> <li>• Fast-acting carbohydrate for low blood glucose</li> <li>• Extra snack for longer coverage than fast-acting carbohydrate</li> <li>• Glucagon emergency kit</li> <li>• Rapid-acting insulin and syringes</li> <li>• At least one full box of infusion sets and insulin cartridges</li> <li>• Infusion site preparation products (antiseptic wipes, skin adhesive)</li> <li>• Ketone testing strips</li> <li>• Long-acting insulin, or a prescription in case you need to be without your t:slim Pump for a period of time.</li> <li>• A written plan describing how to cover yourself with injections if you need to be without your t:slim Pump for a period of time. Discuss this back-up plan with your healthcare provider.</li> <li>• t:slim Pump USB cable</li> </ul>	<ul style="list-style-type: none"> <li>• Your everyday supplies carry kit</li> <li>• Estimate how many cartridges and infusion sets you will need; take 2 to 3 times this amount</li> <li>• Additional rapid-acting insulin and a prescription</li> <li>• Long-acting insulin, or a prescription</li> <li>• A written plan describing how to cover yourself with injections if you need to be without your t:slim Pump for a period of time. Discuss this back-up plan with your healthcare provider.</li> <li>• t:slim Pump USB cable</li> </ul>

## Sick Day Supplies

Supplies to Keep On Hand	Foods to Keep On Hand
<ul style="list-style-type: none"><li>• Ketone testing strips</li><li>• Blood glucose testing supplies: meter, strips, lancets, meter batteries</li><li>• Rapid-acting insulin and syringes</li><li>• Thermometer</li><li>• Over-the-counter medications for colds, flu, diarrhea, vomiting</li></ul>	<ul style="list-style-type: none"><li>• Sports drinks</li><li>• Fruit juice</li><li>• Regular and diet soda</li><li>• Canned soup</li><li>• Regular gelatin</li><li>• Instant pudding</li><li>• Applesauce</li></ul>

## Time-Off Pump

It may be necessary to disconnect from your t:slim Pump for a short period of time; for example, contact sports, a day at the beach, a medical procedure, an insulin pump malfunction, or maybe you are just out of supplies. Check with your healthcare provider for specific instructions and a back-up plan for time-off of your t:slim Pump. Some general guidelines are provided below.

Time-Off Your t:slim Pump	Plan
1 hour or less	Monitor BG. Treat for high or low BG as needed before disconnecting.
1–4 hours	Determine amount of time to disconnect from t:slim Pump. Bolus the calculated amount of missed basal insulin for that period. Reduce amount for activity, if necessary. Remove your t:slim Pump. Cover carbohydrate by reconnecting to pump or by injection.
Over 4 hours	Refer to your back-up plan agreed upon by your healthcare provider.

## Quick Reference Guides

### Treatment Guidelines for Hyperglycemia

If blood glucose (BG) is above target but below 250 mg/dL, take a correction bolus via your t:slim Pump as directed. Recheck BG in 1 to 2 hours.

If BG is not responding to treatment, test ketones (blood or urine) and follow guidelines below.

If BG remains above 250 mg/dL, or you have symptoms of DKA, test for ketones

If Ketones are Negative:	If Ketones are Positive: (or, if BG is not responding to correction bolus)
<ul style="list-style-type: none"> <li>• Visually inspect entire infusion set and site. Correct any problems if identified. See Troubleshooting Guide on page 63.</li> <li>• Use correction factor to calculate and administer an insulin injection by syringe or pen.</li> <li>• Drink 8 oz of sugar-free fluids every 30 minutes to prevent dehydration.</li> <li>• Continue to monitor every 1–2 hours until BG returns to normal.</li> <li>• If BG is not responding to the correction bolus, follow procedure to the right for positive ketones.</li> </ul>	<ul style="list-style-type: none"> <li>• Use correction factor to calculate and administer an insulin injection by syringe or pen.</li> <li>• Change entire infusion set and site using a new cartridge and new insulin.</li> <li>• Drink 8 oz of sugar-free fluids every 30 minutes to prevent dehydration.</li> <li>• Continue to monitor every 1–2 hours until BG returns to normal.</li> <li>• If BG is not responding to treatment, contact your healthcare provider IMMEDIATELY.</li> </ul>

(Adapted from AADE, 2008)

If your BG is above 250 mg/dL two times in a row and/or is not responding to a correction bolus, test for ketones, change entire infusion set and site, correct by injection, and refer to Hyperglycemia Troubleshooting Guide on page 63.

### Treatment Guidelines for Hypoglycemia

Mild Hypoglycemia	Severe Hypoglycemia
<p>Self-treated by eating fast-acting carbohydrate. Follow Rule of 15.</p> <ol style="list-style-type: none"> <li>1. Eat 15 grams of fast-acting carbohydrate</li> <li>2. Monitor BG after 15 minutes</li> <li>3. Repeat treatment if BG is less than 70 mg/dL</li> <li>4. Repeat monitoring and treatment until BG returns to normal range. Contact your healthcare provider if you are not responding to treatment.</li> </ol>	<ul style="list-style-type: none"> <li>• Typically requires assistance. Discuss a treatment plan with your friends, family members, and/or caregivers. They should be instructed to call 911 if you become unresponsive, combative (unusually aggressive), unconscious, or have seizures.</li> <li>• A glucagon emergency kit is used to treat severe hypoglycemia. It will require a prescription from your healthcare provider and should be kept on hand. Glucagon is administered by injection and almost always by someone else. It is a good idea to train a close friend or family member how to inject glucagon and review the steps on an annual basis.</li> </ul>

(Adapted from ADA, 2014)

Notes: \_\_\_\_\_

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Useful Forms

Insulin Pump Dosing Settings – Personal Profiles Form

Know your settings. Be sure to always keep a current written record of your insulin dose settings.

Bolus to be Programmed Using: <input type="checkbox"/> Grams of Carbs   -or- <input type="checkbox"/> Units of Insulin				
Personal Profile Name: _____				Date: _____
Time	Basal Rate (0; 0.100–15 u)	Correction Factor (1–600)	Carb Ratio (1–300)	Target BG (70–250 mg/dL)
Midnight				

Bolus to be Programmed Using: <input type="checkbox"/> Grams of Carbs   -or- <input type="checkbox"/> Units of Insulin				
Personal Profile Name: _____				Date: _____
Time	Basal Rate (0; 0.100–15 u)	Correction Factor (1–600)	Carb Ratio (1–300)	Target BG (70–250 mg/dL)
Midnight				

Bolus to be Programmed Using: <input type="checkbox"/> Grams of Carbs   -or- <input type="checkbox"/> Units of Insulin				
Personal Profile Name: _____				Date: _____
Time	Basal Rate (0; 0.100–15 u)	Correction Factor (1–600)	Carb Ratio (1–300)	Target BG (70–250 mg/dL)
Midnight				



**(Information needed to calculate insulin dose for injections)**

- » 1 unit of rapid-acting insulin for every \_\_\_\_\_ mg/dL that your BG is over target of \_\_\_\_\_ mg/dL.
- » 1 unit of rapid-acting insulin per \_\_\_\_\_ grams of carbohydrate eaten.
- » Total basal insulin in pump may be used to calculate long-acting insulin injection dose \_\_\_\_\_.

---

## YOUR INSULIN DOSES

- » Download your pump frequently to have the latest pump settings saved.
- » Discuss a back-up plan with your Healthcare Provider in advance in case you need to inject insulin with a syringe. You may need a prescription for long acting insulin.
- » Always be ready for the unexpected, carry extra supplies and be equipped to return to injections if needed.

## BE PREPARED FOR AN URGENT SITUATION



# TANDEM™

## DIABETES CARE

DATE \_\_\_\_\_

			
	NAME		
		(       )	-
	HEALTHCARE PROVIDER	PHONE	
		(       )	-
	PHARMACY	PHONE	

If technical assistance is needed contact  
Tandem Diabetes Care Technical Support



# 1-877-801-6901

## TROUBLESHOOTING HYPERGLYCEMIA

- 1 Begin Troubleshooting:**
  - » Review pump history and alerts to make sure the basal is delivering and the last bolus was given.
  - » Disconnect pump from your body and check the condition of the infusion site, tubing, cartridge and pump.
  - » Look for signs of infection, occlusions, kinking or insulin leakage.
- 2 Change Infusion Site,** "When in doubt, change it out." Change insulin, tubing & cartridge if necessary.
- 3 Treat high blood glucose (BG) (>250mg/dL)** as directed by your Healthcare Provider (HCP) and have emergency kit available as recommended by your HCP.
- 4 Check for Ketones** as directed by your Healthcare Provider.
- 5 Take Rapid-Acting Insulin by Injection,** if ketones are present.
- 6 Drink Plenty of Water** or sugar-free fluids to prevent dehydration.
- 7 Recheck BG within 1 to 2 hours** to ensure BG is responding to treatment.
- 8 Go to Nearest ER or Call 911,** if nausea, vomiting and/or moderate to large ketones are present, your blood glucose remains > 250mg/dL after injecting insulin, or your HCP is not available.

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Adapted from "Insulin Pump Therapy: Guidelines for Successful Outcomes;" American Association of Diabetes Educators 2008 Consensus Summit, September 18, 2008, Chicago, IL.

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## Useful Forms

Exercise Log

	Example	Date	Date	Date	Date	Date
	↓	↓	↓	↓	↓	↓
Exercise Type	Walk					
Time at Start	Sept. 2 9:00 am					
Duration	35 Min.					
Intensity	Easy					
Insulin (dose, IOB, temp rate)	No IOB, no temp rate					
BG Before	171 8:30 am					
BG at Start	159 9:00 am					
Snack Before (grams)	15					
BG During	131 9:20 am					
Snack During (grams)	0					
BG After	119 9:40 am					
Snack After (grams)	0					
BG Later & Time	139 11:00 am					
Notes	Felt Good					

## Exercise Log

	Date	Date	Date	Date	Date	Date
	↓	↓	↓	↓	↓	↓
Exercise Type						
Time at Start						
Duration						
Intensity						
Insulin ( <i>dose, IOB, temp rate</i> )						
BG Before						
BG at Start						
Snack Before ( <i>grams</i> )						
BG During						
Snack During ( <i>grams</i> )						
BG After						
Snack After ( <i>grams</i> )						
BG Later & Time						
Notes						

Useful Forms

Basal Evaluation Log

Blood Glucose in mg/dL	240					
	220					
	200					
	180					
	160					
	140					
	120					
	100					
	80					
	At Start	1 hour	2 hours	3 hours	4 hours	5 hours
BG mg/dL						
Time						
Basal Rate						

Blood Glucose in mg/dL	240					
	220					
	200					
	180					
	160					
	140					
	120					
	100					
	80					
	At Start	1 hour	2 hours	3 hours	4 hours	5 hours
BG mg/dL						
Time						
Basal Rate						

## Carb Ratio Evaluation Log

Blood Glucose in mg/dL	240					
	220					
	200					
	180					
	160					
	140					
	120					
	100					
	80					
	Before Meal	1 hour	2 hours	3 hours	4 hours	5 hours
BG mg/dL						
Time						
Carb Ratio						

## Correction Factor Evaluation Log

Blood Glucose in mg/dL	240					
	220					
	200					
	180					
	160					
	140					
	120					
	100					
	80					
	At Start	1 hour	2 hours	3 hours	4 hours	5 hours
BG mg/dL						
Time						
Correction Factor						

# Transfer Pump Settings Worksheet

# STEP 1

Enter ALL time changes and corresponding pump settings from current pump into each table below.

BASAL RATES		
<input checked="" type="checkbox"/>	Time	Rate
<input type="checkbox"/>	12:00 am	
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
Total Basal Dose:		

CORRECTION FACTOR		
<input checked="" type="checkbox"/>	Time	Factor
<input type="checkbox"/>	12:00 am	
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

CARB RATIO		
<input checked="" type="checkbox"/>	Time	Ratio
<input type="checkbox"/>	12:00 am	
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

BLOOD GLUCOSE TARGET		
<input checked="" type="checkbox"/>	Time	Target
<input type="checkbox"/>	12:00 am	
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

## STEP 2

- Transfer ALL 12 am settings (Basal Rates, Correction Factors, Carb Ratios, and Target BG), from the tables on the left to the first row of the Personal Profiles table below.
- IN ORDER OF TIME OF DAY, transfer ALL remaining time segments and corresponding pump settings to the table below.
- Check the left column as each setting is entered.

PERSONAL PROFILES				
Time	Basal	Correct	Carb	Target
12:00 am				
		Total Basal Dose		

## STEP 3

- Verify ALL time segments are IN ORDER OF TIME OF DAY and ALL corresponding pump settings are transferred.
- Program these settings into t:slim Pump Personal Profiles using the table above.





# Glossary

**Basal** – A slow, continuous delivery of insulin which keeps the blood glucose level stable between meals and during sleep. A basal rate is measured in units per hour.

**Basal Testing** – A process of testing basal rates to determine if changes are needed and to customize basal rate settings.

**Blood Glucose (BG)** – The level of glucose in the blood, measured in mg/dL.

**Blood Glucose Reminder** – An insulin pump feature that can be set to remind the user to check blood glucose within a specific time following a high or low blood glucose event.

**Bolus** – A quick dose of insulin that is delivered to cover food consumed or elevated blood glucose.

**Cannula** – The section of the infusion set that is inserted under the skin through which insulin is delivered.

**Carb Choice** – A food item that contains approximately 15 grams of carbohydrate per serving.

**Carb Ratio (Insulin-to-Carbohydrate Ratio)** – The grams of carbohydrate that 1 unit of insulin will cover.

**Carbohydrate (Carb)** – Sugars and starches that the body breaks down to glucose and uses as an energy source, measured in grams.

**Carbohydrate Counting** – A method of meal planning based on counting the grams of carbohydrate in food.

**Cartridge** – The area of the t:slim Pump that holds the insulin.

**Continuous Glucose Monitor (CGM)** – A device consisting of a sensor inserted under the skin that sends glucose readings to a receiver.

**Correction Bolus** – A dose of insulin given to correct elevated blood glucose.

**Correction Factor (Insulin Sensitivity Factor)** – The amount of blood glucose that is lowered by 1 unit of insulin.

**Diabetic Ketoacidosis (DKA)** – An emergency condition in which extremely high blood glucose levels, along with a severe lack of insulin, result in the breakdown of body fat for energy and an accumulation of ketones in the blood and urine.

**Insulin Duration** – The amount of time that insulin is active and available in the body after a bolus has been delivered. It is also used in the calculation for insulin on board (IOB).

**Extended Bolus** – A bolus that is delivered over a set period of time.

**Gastroparesis** – A condition that slows stomach emptying and digestion.

**Glucagon Emergency Kit** – A kit containing glucagon (a hormone that quickly increases blood glucose) and a syringe used to treat severe hypoglycemia. Glucagon requires a prescription and is administered as an injection, usually by someone else.

**Glycemic Index** – A system that ranks carbohydrate foods according to how much they raise blood glucose compared with a reference food.

**Glycemic Load** – A system that considers both serving size and the Glycemic Index to determine the food's effect on blood glucose.

**Glycogen** – The stored form of glucose found in the liver and muscles.

**Hyperglycemia** – High blood glucose.

**Hypoglycemia** – Low blood glucose.

# Glossary

**Hypoglycemia Unawareness** – A state in which a person does not feel or recognize the symptoms of low blood glucose.

**Infusion Set** – A complete tubing system that is attached to the end of the cartridge of the insulin pump and connects to the body at the infusion site through which insulin is delivered.

**Infusion Site** – The area on the body into which the cannula and needle are inserted.

**Insertion Device** – A device used to insert the cannula under the skin.

**Insulin on Board (IOB)** – Reflects how much insulin is remaining in the body from a previous bolus (or boluses) that will continue to lower blood glucose. It is also referred to as active insulin or bolus on board.

**Insulin Stacking** – Occurs when multiple boluses of insulin accumulate in the blood and may lead to hypoglycemia.

**Introducer Needle** – A small needle used to insert the cannula under the skin and is removed after insertion.

**Ketones** – A waste product that accumulates when glucose is not available and fat is used for energy.

**Luer Lock** – Connects and locks the infusion set tubing to the insulin pump cartridge.

**Missed Meal Bolus Reminder** – A programmable setting to notify the user of a possible missed meal bolus.

**Net Carbs (Impact Carbs, Active Carbs)** – Terms used on food labels indicating that all of the fiber and sugar alcohol have been subtracted from the Total Carbohydrate. These terms are not regulated by the FDA.

**Personal Profile** – A personalized group of settings that define the delivery of basal and bolus insulin within specific time segments throughout a 24-hour period.

**PIE Format** – A three-step process (Prepare, Investigate, Evaluate) designed for testing and fine-tuning insulin dose settings.

**Quick Bolus** – A secondary way to deliver a bolus by following vibration and beep commands without navigating through or viewing the insulin pump screen.

**Site Reminder** – A programmable setting to remind the pump user when it is time for an infusion set to be changed.

**Sugar Alcohol** – Reduced calorie sweeteners that are slowly absorbed and poorly digested.

**USB Cable** – The Universal Serial Bus (USB) cord that is used to charge the t:slim Pump battery.

**Target Blood Glucose** – A specific blood glucose goal used to calculate a correction bolus.

**Temporary Rate** – A feature in the insulin pump that allows a short-term adjustment to the basal rate.

**Time Segments** – Specific time periods within a Personal Profile where basal rates, correction factors, carb ratios, and target blood glucose values are set.

**Tubing** – A flexible tube that allows insulin to flow from the pump to the infusion site.

**Units (of insulin)** – Measurement of insulin.

## Your Resource Guide

## Organizations

Name	Website
American Association of Diabetes Educators (AADE)	<a href="http://www.diabeteseducator.org">www.diabeteseducator.org</a>
American Diabetes Association (ADA)	<a href="http://www.diabetes.org">www.diabetes.org</a>
Academy of Nutrition and Dietetics	<a href="http://www.eatright.org">www.eatright.org</a>
American Association of Clinical Endocrinologists (AACE)	<a href="http://www.aace.com">www.aace.com</a>
Behavioral Diabetes Institute (BDI)	<a href="http://www.behavioraldiabetesinstitute.org">www.behavioraldiabetesinstitute.org</a>
Children with Diabetes (CWD)	<a href="http://www.childrenwithdiabetes.com">www.childrenwithdiabetes.com</a>
Insulindependence (IN)	<a href="http://www.insulindependence.org">www.insulindependence.org</a>
International Diabetes Federation (IDF)	<a href="http://www.idf.org">www.idf.org</a>
Joslin Diabetes Center	<a href="http://www.joslin.org">www.joslin.org</a>
JDRF	<a href="http://www.jdrf.org">www.jdrf.org</a>
Mayo Clinic	<a href="http://www.mayoclinic.com/health/diabetes/DS01121">www.mayoclinic.com/health/diabetes/DS01121</a>
National Diabetes Education Program (NDEP)	<a href="http://www.ndep.nih.gov">www.ndep.nih.gov</a>
National Institutes of Health (NIH)	<a href="http://www.health.nih.gov/topic/diabetes">www.health.nih.gov/topic/diabetes</a>
Taking Control of Your Diabetes (TCOYD)	<a href="http://www.tcoyd.org">www.tcoyd.org</a>
Type 1 University (t1U)	<a href="http://www.type1university.com">www.type1university.com</a>

## Printed and Web-based Education Material

*American Diabetes Association Guide to Healthy Restaurant Eating: What to eat in America's most popular chain restaurants.* 4th Edition. Hope Warsaw, MMSc, RD, CDE. American Diabetes Association, 2009.

*Choose Your Foods: Exchange Lists for Diabetes: Description and guidelines for use.* American Diabetes Association. Journal of the American Dietetic Association, 2008 May;108:883-888.

*Complete Guide to Carb Counting: How to Take the Mystery Out of Carb Counting and Improve Your Blood Glucose Control.* 3rd Edition. Hope Warshaw, MMSc RD, CDE, Karmeen Kulkarni, MS, RD, CDE. American Diabetes Association. 2011.

*Diabetes Meal Planning Made Easy.* 4th Edition. Hope S. Warshaw, MMSc, RD, CDE, BC-ADM. American Diabetes Association, 2010.

*Taking Control of Your Diabetes.* 3rd Edition. Steven V. Edelman, MD, and Friends. Professional Communications, Inc., 2007

*Diabetes 911: How to Handle Everyday Emergencies.* Larry A. Fox, MD, Sandra L. Weber, MD. American Diabetes Association, 2009.

*Diabetes Burnout: What to Do When You Can't Take It Anymore.* 1st edition. William H. Polonsky, PhD, CDE. American Diabetes Association, 1999.

*Diabetic Athlete's Handbook.* Sheri R. Colberg, PhD. Human Kinetics, 2009.

*The Diabetes Game: A Teenager's Guide to Living Well with Diabetes.* Nora Coon. Rewarding Health, Inc., 2006.

*Pumping Insulin: Everything You Need for Success With an Insulin Pump and CGM.* 5th Edition. John Walsh, PA, CDE, Ruth Roberts, MA. Torrey Pines Press, 2012.

*Smart Pumping for People With Diabetes.* 1st Edition. Howard Wolpert, MD. American Diabetes Association, 2002.

*Think like a Pancreas: A Practical Guide to Managing Diabetes with Insulin.* Gary Scheiner, MS, CDE. Da Capo Press; 1st edition, 2004.

*Understanding Insulin Pumps & Continuous Glucose Monitors.* Peter Chase, MD. Children's Diabetes Foundation, 2010

*Putting Your Patients on the Pump.* 2nd Edition. Bolderman K. American Diabetes Association, 2013.

*Diabetes Forecast Magazine*

[www.forecast.diabetes.org](http://www.forecast.diabetes.org)

*Diabetes Health Magazine*

[www.diabeteshealth.com](http://www.diabeteshealth.com)

*Diabetes Living Magazine*

[www.diabeticlivingonline.com](http://www.diabeticlivingonline.com)

*Diabetes Self-Management Magazine*

[www.diabetesselfmanagement.com](http://www.diabetesselfmanagement.com)

*Diabetes Net*

[www.diabetesnet.com](http://www.diabetesnet.com)



# References

*Medical Management of Type 1 Diabetes.* 6th Edition. American Diabetes Association, 2012.

*Insulin analogues.* Hirsch I. N Engl J Med, 2005; 352:174-183

*Is the frequency of self-monitoring of blood glucose related to long-term metabolic control?* Schutt M, Kern W, et al. Exp Clin Endocrinol Diabetes, 2006;114(7):384-388.

*Nutrition recommendations and interventions for people with diabetes: A position statement of the American Diabetes Association (Position Statement).* Diabetes Care, 2008 January; 31(1):s64.

*Understanding Nutrition.* 13th Edition. Whitney E, Rolfes S. Cengage Learning, 2012.

*Choose Your Foods: Exchange Lists for Diabetes: description and guidelines for use.* American Diabetes Association. Journal of the American Dietetic Association, 2008 May;108:883-888.

*Pumping Insulin: Everything You Need for Success With an Insulin Pump and CGM.* 5th Edition. John Walsh, PA, CDE, Ruth Roberts, MA. Torrey Pines Press, 2012.

*Acute effect of meal glycemic index and glycemic load on blood glucose and insulin responses in humans.* Galgani J, Aguirre C, Diaz E. Nutr J, 2006; 5:22.

*Smart Pumping for People With Diabetes.* 1st Edition. Howard Wolpert, MD. American Diabetes Association, 2002.

*Insulin pump therapy: Guidelines for successful outcomes.* Scheiner G, Sobel RJ, Smith DE, Pick A, Kruger D, King J, Green K. American Association of Diabetes Educators, 2008.

*Changes in basal insulin infusion rates with subcutaneous insulin infusion time until a change in metabolic effect is induced in patients with type 1 diabetes.* Heinemann L, Nosek L, Kapitza Z, M Schweitzer, L Krinelke. Diabetes Care, 2009 August; 32(8): 1437–1439.

*Standards of Medical Care in Diabetes – 2014.* American Diabetes Association, 2014 January;37(1):s14-s80.





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[www.tandemdiabetes.com](http://www.tandemdiabetes.com)

The t:slim® Insulin Delivery System is intended for the subcutaneous delivery of insulin, at set and variable rates, for the management of diabetes mellitus in persons requiring insulin, for individuals 12 years of age and greater.

t:slim Pump is available for sale by or on the order of a physician.

The t:connect® Diabetes Management Application is intended for use by individuals with diabetes mellitus who use Tandem Diabetes Care insulin pumps, their caregivers, and their healthcare providers in home and clinical settings.

The t:connect Application supports diabetes management through the display and analysis of information downloaded from Tandem Diabetes Care insulin pumps and specified blood glucose meters.