



Embrace<sup>®</sup>  
Better Care  
Program

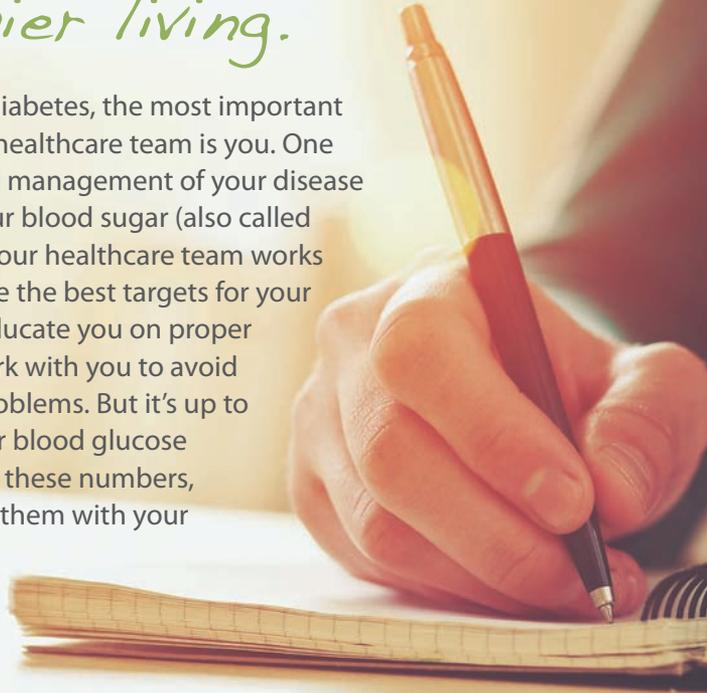
# Blood Glucose Monitoring

*Achieving Accurate Results*

An Omnis Health Guide to monitoring and  
managing your diabetes

# You hold the key to *healthier living.*

When you have diabetes, the most important member of your healthcare team is you. One part of successful management of your disease is monitoring your blood sugar (also called blood glucose). Your healthcare team works to help determine the best targets for your glucose levels, educate you on proper self-care, and work with you to avoid serious health problems. But it's up to you to check your blood glucose routinely and log these numbers, and then discuss them with your healthcare team.

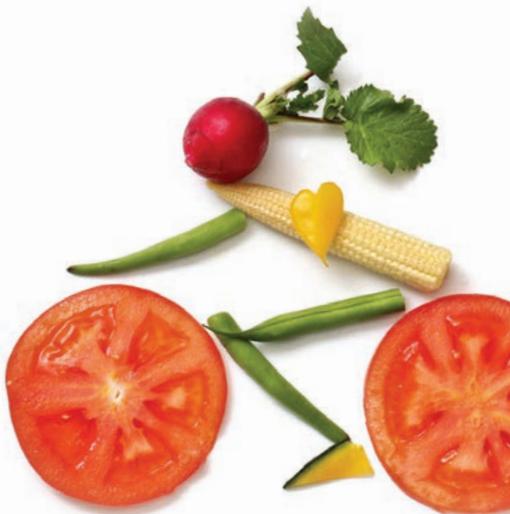


## **Blood glucose monitoring provides invaluable information that can help you and your healthcare team:**

- Identify trends in your glucose control and factors that cause your values to fall above or below your target ranges.
- Evaluate if your nutrition plan, physical activity, medications, and other treatment options are helping you stay on target with your blood glucose goals.
- Confirm if how you are feeling is the result of low or high blood glucose, or something unrelated to your diabetes.
- Decide if your treatment plan is effective, or if changes are necessary.
- Determine action plans for special events, such as illness, injury, or stress.<sup>1</sup>

## The Target

The ultimate goal of keeping a daily record of your blood glucose levels is to hit ideal target levels and keep these as close to normal as possible. When you test and track your glucose, you can make more informed choices around things like food and exercise throughout your day. If your glucose readings aren't ideal, you may need to talk to your doctor about altering your medication dosage, meal times, or exercise regimen.



## When to Test

How frequently you need to monitor your blood glucose levels is an individual matter that should be guided by your doctor. In general, testing at least three times a day is recommended. If you use insulin, you may be directed to test more often. You may also find you need to test more frequently when you are sick or face changes in your daily routine.

### Blood Glucose at a Glance

#### General targets for people with diabetes:

- ▶ Before meals = 70 to 130 mg/dl
- ▶ 1 to 2 hours after the start of a meal = < 180 mg/dl
- ▶ Bedtime = 90 to 150 mg/dl
- ▶ A1C test = <7%

**Hyperglycemia** = High blood glucose (at or above 160 mg/dl)

**Hypoglycemia** = Low blood glucose (below 70 mg/dl)<sup>2</sup>



# Blood Glucose Monitors

*Essential tools for successful self-management*



Today's blood glucose monitoring systems are designed to be convenient and easy to use. It's now standard for most to require only a minimal blood sample and feature a quick test process. Many glucose meters allow testing on your fingertips as well as less-sensitive alternate sites, such as your forearms or the fleshy part of your palms.

There are many types of glucose meters available, all of which are cleared for use by the Food and Drug Administration (FDA) after extensive clinical testing. Most come with three components:

**Lancets** that are used to get a drop of blood from your fingertip or alternate test site

**Test strips**, where you place the blood you are testing

**Control solutions**, or liquids used to make sure your meter is functioning properly

## Blood Glucose Monitors

Meters come in different sizes with different features that suit certain lifestyles or needs better. For instance, some “speak” directions and results and have larger screens. These are good choices for people with vision problems.<sup>3</sup> Others are compact in size, offering convenience for travel.

Your diabetes care team should help you select the system that fits your needs and work with you to understand how to use your meter comfortably and confidently. In addition, your health insurance or Medicare may pay for all or a portion of your blood glucose meter and test strips.



### How accurate is meter testing?

You may think you’re an expert after using your blood glucose meter daily over time. But even medical professionals can make mistakes. The most common reason for glucose testing inaccuracy is user error. For instance, if you use expired test strips or forget to calibrate your meter to the test strips, your results may be unreliable.

In addition to how well you perform the test, your accuracy depends on other factors, including:

- The quality of your meter and test strips.
- Your hematocrit, or the amount of red blood cells in the blood. Your test results may be less accurate if you are dehydrated or anemic.
- Interfering substances, like Vitamin C, acetaminophen (Tylenol®), or uric acid. Check your meter and test strip instructions for notes on what substances may impact test accuracy.
- High altitude, extreme temperatures, and humidity, which can cause unpredictable effects on glucose results.
- Improper handling or storage, such as failure to keep test strip vials closed.<sup>4</sup>

# Tips for *Accurate Testing*



## Getting a good drop of blood.

Before sticking your finger, be sure to help stimulate blood flow to your hands and fingertips:

- Thoroughly wash your hands with warm water.
- Shake your hands below your waist.
- Vary your testing sites to minimize callused or sore fingertips.
- Massage the palm and squeeze or milk your finger a few times.

## Recording your results.

Track your blood glucose values by writing them down in a log book. If you do not have one already, ask your healthcare provider or use the following as an example:

DATE	BREAKFAST	LUNCH	DINNER	BEDTIME	MEDICATIONS	COMMENTS
1/15	164 mg/dl	93	138	182	DiaBeta – 5 mg at 8:15 am	Swam after lunch for :45

Be sure to note your medications and flag any changes in your dose. More information is better, so share how you felt and if there was a difference in your food, physical activity, health, stress, or insulin reactions.

Bring your log book to all of your appointments with your diabetes healthcare team. They can use your recordings to get a picture of your diabetes and how effective their treatment plan is for you.<sup>1</sup>



### **If You Need Insulin...**

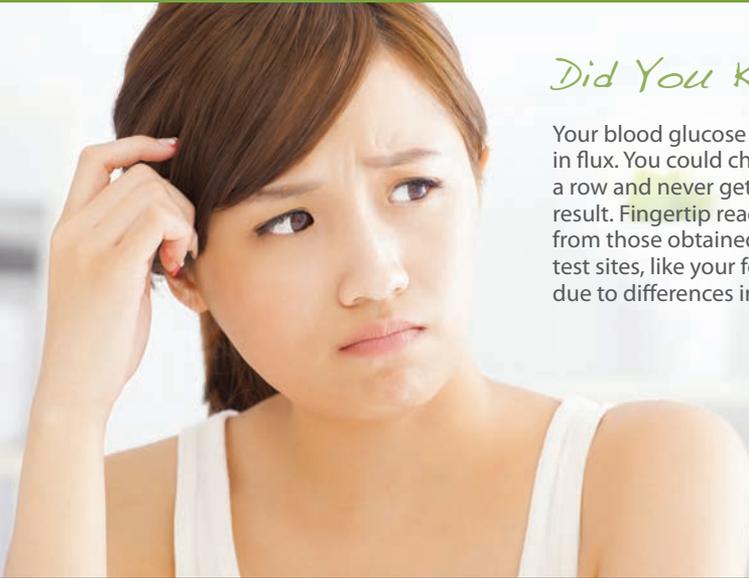
People who take insulin must track with more diligence and detail. In addition to reporting your blood glucose levels, time and dose of your medication, and any physical activity, make sure you are specifically tracking:

- Times of day you take insulin
- The amount and type of insulin you take
- When and what you eat
- Whether you have ketones in your blood or urine
- When you are sick<sup>5</sup>

### **Storing and disposing of your testing supplies.**

- Keep your testing supplies in a dry, cool place, away from direct light.
- Avoid extreme temperatures.
- Dispose lancets in an opaque, plastic container.
- Seal the container with tape and discard according to local guidelines for contaminated waste products.<sup>1</sup>

# Understanding *Your Results*



## *Did You Know?*

Your blood glucose level is constantly in flux. You could check ten times in a row and never get the exact same result. Fingertip readings may differ from those obtained by using alternate test sites, like your forearm or palm, due to differences in blood circulation.

For instance, your glucose concentration in your capillaries (taken from your fingertips) can vary from that in your veins by up to 100 mg/dl at times when your levels are rapidly changing. That's why it's best to avoid alternative site testing and draw blood from your fingertips during these times, which include when:

- You have just taken insulin
- You think your blood sugar is low
- You are not aware of symptoms when you become hypoglycemic
- You have just eaten or exercised
- You are ill or under stress
- The results do not agree with the way you feel

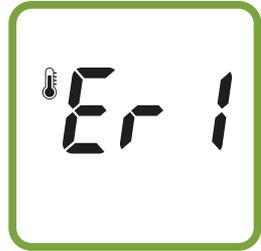
Lastly, you should not use results from an alternate site when calibrating a continuous glucose monitor (CGM), or calculating insulin dosing.<sup>4</sup>

# Checking Your *Meter's Performance*

Follow these three steps to make sure your meter is working properly:

- ▶ **Use liquid control solutions.** Test a drop of these solutions like you would a drop of your blood. The value should match that written on your test strip vial label. Use these solutions every time you open a new container of test strips, if you drop the meter, whenever you get unusual results, and occasionally as you go through your strip container.

- ▶ **Follow electronic checks.** Your meter should provide an electronic check automatically when you turn it on. If there is a problem, you will see an error code. Make sure you consult your user manual to address the error, or call the manufacturer or doctor if you are unsure how to proceed.



- ▶ **Compare your meter results with a laboratory test.** Compare your meter results with a laboratory test. Take your meter with you to doctor appointments. From time to time, it helps to ask your doctor to watch your testing technique, to look out for ways to improve your technique or correct issues. You should also have your blood tested with a laboratory method to compare results from your self-testing.<sup>4</sup>

*Compared with laboratory tests, blood glucose meters have an accuracy level of  $\pm 20\%$ . For example, if your laboratory result is 100 mg/dl, your meter result may be anywhere from 80 to 120 mg/dl.<sup>6</sup>*



# Focus on the *Bigger Picture*



Monitoring your blood glucose levels is essential to staying within your target range. While it's important to use the information you gather to determine why your levels may be high or low so you can address potentially dangerous situations, it's also important to not be thrown off or dismayed by your numbers. Not all readings are accurate and—above all—the patterns and trends in your results are what will give you the best insight into your diabetes.

## *Remember:*

### **Certain situations can affect your results**

- Eating can raise your blood glucose levels, even a small snack or piece of candy.
- Exercise could impact your levels long after your workout.
- Stress causes unique reactions in all of us.
- Over-the-counter and prescription medications should be taken with care.

# Keep Your Healthcare Team *Informed*

If your meter results don't match how you feel, don't be discouraged. Keep your healthcare team in the loop so they can help you understand what's happening and get on the path to better self-care.

## *Final Checklist*

Always read the instructions that come with your meter and test strips.

Test, then test again if your readings don't seem right.

Record your levels throughout the day, and note special events or changes in your care plan.

Check your testing technique at doctor's appointments, and do regular lab tests to compare results.

Don't test on alternate sites if you've recently eaten, exercised, taken insulin, or if you feel ill or stressed.



More

# From Omnis Health

For additional guides to managing your diabetes, visit:

**Embracebettercare.com**

*Information sourced through:*

Joslin Diabetes Center. **www.joslin.org**

National Institute of Diabetes and Digestive and Kidney Diseases; National Diabetes Information Clearinghouse, June 2014. **www.niddk.nih.gov**

U.S. Food and Drug Administration. **www.fda.gov**



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

Information shared here should not replace advice from your diabetes healthcare team. You should work with your team to learn how to check and log your blood glucose, set health and lifestyle goals, and effectively treat symptoms of your diabetes.

1. [http://www.joslin.org/info/monitoring\\_your\\_blood\\_glucose.html](http://www.joslin.org/info/monitoring_your_blood_glucose.html)
2. <http://www.niddk.nih.gov/health-information/health-topics/Diabetes/eating-diabetes/Pages/eating-diabetes.aspx#levels>
3. <http://www.fda.gov/forconsumers/byaudience/forwomen/womenshealthtopics/ucm216232.htm>
4. <http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/InVitroDiagnostics/GlucoseTestingDevices/default.htm>
5. <http://www.niddk.nih.gov/health-information/health-topics/Diabetes/your-guide-diabetes/Pages/monitor.aspx>
6. <http://www.diabetesselfmanagement.com/about-diabetes/diabetes-basics/understanding-your-lab-test-results/>