

## Blood Sugar Monitoring

### Know Your Blood Sugar Numbers

Taking control of your diabetes and blood glucose (blood sugar) can make you feel better and stay healthy. Research shows that maintaining your blood glucose level close to normal reduces your chances of having eye, kidney and nerve damage. Taking control of your diabetes means you need to know your blood glucose numbers and your target goals, and you need to keep your blood glucose numbers near your goal numbers.

Two ways to measure your blood glucose are:

1. **The A1C test** - This test used to be called hemoglobin A1C (HbA1C). It measures your average blood glucose level over the past 3 months. It is the best way for you and your doctor to know your overall blood glucose control during this period of time.
2. **Self-monitoring blood glucose (SMBG) test** - This is a test you do yourself using a blood glucose monitor (also known as a blood glucose meter) and a drop of blood. It measures your blood glucose at the time you check it.

Both of these tests should be used by you and your diabetes health care provider or team (doctor, diabetes educator and/or pharmacist) to manage your diabetes and get a complete picture of your diabetes control.

Checking your blood glucose with a monitor helps you see how food, medicine and physical activity affect your blood glucose level. Blood glucose monitors allow you to check and track your glucose levels over time while at home, school, work and play. The blood glucose readings you get from a monitor can help you make decisions in managing your diabetes every day or even every hour. Self-monitoring your blood glucose allows you to recognize emergency situations and respond to high or low blood glucose levels with the appropriate intervention.

### Testing Your Blood Glucose (Sugar)

Some people with diabetes may need to monitor (test) their blood glucose levels more than others as diabetes care should be tailored for each person. Make sure to talk to your diabetes health care provider about how often you need to test using your blood glucose monitor.

Self-monitoring of blood glucose (SMBG) is highly recommended for everyone with diabetes, but especially for those who use insulin to control their diabetes to monitor for and prevent hypoglycemia (low blood sugar). If you have type 1 diabetes, the American Diabetes Association (ADA) suggests that you test your blood glucose level 3 or more times a day. It is also recommended that pregnant women with gestational diabetes taking insulin test their glucose 3 or more times a day. If you have type 2 diabetes, the optimal frequency and timing of SMBG is unknown, but the ADA states testing should be sufficient to facilitate reaching your glucose goals. People with type 1 and type 2 diabetes should test their glucose levels more often when their diabetes therapy has been modified. The role of SMBG in diabetics stable on diet treatment is not known.

Self-monitoring plans set up by diabetes health care providers often direct people with diabetes to test their glucose before meals, 2 hours after meals, at bedtime, at 3:00 a.m. and anytime the person experiences sign and symptoms. Testing should occur more often when types of medications are changed, when dosing of medications are changed, when a person is ill or stressed and during any other unusual conditions. Make sure to talk with your doctor or diabetes educator about how often and when you should test your blood glucose.

### How a Blood Glucose Monitor Works

Portable blood glucose monitors are small, battery operated devices. Typically, a small sample of blood is placed on a disposable test strip, which is coated with a chemical (reagent) that combines with the glucose in the blood. The test strip with the sample of blood is placed into the monitor allowing the monitor to measure how much glucose is present in the blood. Monitors measure blood glucose in different ways. Some monitors measure how much light reflects from the blood sample. Others measure how much electricity passes through the sample. The monitor then displays the amount of glucose in the blood as a number. Make sure to record all your blood glucose readings.

### Choosing a Blood Glucose Monitor

There are a number of blood glucose monitors so making the right choice can be hard. Blood glucose monitors may differ in several ways, such as:

- Ease of use
- Test time

- Test site
- Size
- Ability to store results in memory
- Cleaning and maintenance
- Cost

Before buying a monitor, talk to your diabetes health care provider or pharmacist to make sure you choose a monitor that is best suited for your needs. Things you will want to consider when buying a blood glucose monitor are noted below.

**Ease of use.** Certain monitors are easier to use than others. Some require less steps in operating, some take less time and some use a smaller amount of blood than others. Newer meters may offer features that make them easier to use than older models, such as automatic timing, error codes and signals or barcode readers to help with calibration.

If possible, try to talk with other people who have experience using the monitors. They can share their experiences with you and tell you the pluses and minuses of the monitors. Also, most manufacturers of monitors have a toll free number for customers to call with questions. Remember to talk with your diabetes health care provider before choosing a monitor. He or she will know the differences between the monitors and you will want to make sure your diabetes health care provider will be able to work with the device you choose in order to maximize the benefit of monitoring your blood glucose.

**Test time.** All blood glucose monitors give quick results, usually in a minute or less, so the speed of test results may not play a big factor in choosing a monitor. However, if it is an issue for you, make sure to compare the speeds of the different monitors. Some newer monitors can provide blood glucose results in five seconds.

**Test site.** Conventional blood glucose monitors require a drop of blood using a fingerstick. Some newer monitors allow blood testing from alternative sites, such as the thigh, upper arm, forearm and base of the thumb. Taking blood samples from these alternative sites may be desirable, but it may have some limitations. Before buying a monitor, talk to your diabetes health care provider about the advantages and disadvantages of using conventional monitors using a fingerstick versus monitors that allow alternative site testing.

**Memory.** Some monitors have the ability to record and store a certain number of test results in memory and can be connected to personal computers or personal digital assistants (PDAs) to download, store and print test results. These features can assist you and your diabetes health care provider in keeping track of your blood glucose results and guiding your diabetes care plan.

**Size.** All blood glucose monitors are relatively small, lightweight and use batteries, making them portable. The monitors do vary some in size, so if this is important to you, make sure to compare the size of the different monitors. Please keep in mind that the smaller the monitor, the more likely you may be to carry it with you and use it.

**Visual vs. audio monitors.** Most monitors have visual instructions and use a visual monitor to display blood glucose results. If you are hearing impaired, you will want to choose a visual blood glucose monitor. For people with visual impairments, they can still monitor their blood glucose. A number of monitors today have large display screens or give verbal instructions and verbal test results. Some monitors even "speak" in Spanish and other languages.

**Accuracy.** The monitors available today are fairly accurate when used properly. However, monitors may become less accurate over time. Other factors, such as climate and certain substances, may also affect the accuracy of results. Thus, it is important to test your monitor to make sure it is providing accurate readings. Be sure to choose a monitor that is most appropriate for the climate you live in and offers a method of testing the accuracy of results.

**Cleaning and maintenance.** Each monitor needs to be properly cared for; however, certain monitors require more cleaning and maintenance than others. So, it may be important to you to choose a monitor that is easy to clean and maintain. Once you buy a monitor, make sure to follow the manufacturer's instructions on proper care.

**Cost.** The cost of blood glucose monitors and supplies are often covered by health insurance. Some health insurance companies may offer coverage or have special arrangements for certain monitors. However, don't assume your insurance company will reimburse you. Make sure to talk with your health insurance company before you buy a monitor to see if the company covers monitors and if so, which ones the company does cover.

If you do not have health insurance or if your insurance does not cover blood glucose monitors, you can find trade-in monitors at a lower cost, rebates and special purchase offers. Watch for local ads and compare prices before you buy. Check with your diabetes health care team and your pharmacist about offers on monitors to help save you money.

The cost of testing supplies you will need with a monitor can be costly and may influence your decision when choosing a monitor. Make sure to check the cost of the testing supplies when considering a monitor. As with the monitor, talk with your health insurance company first to see if and what testing supplies they cover. Even though blood glucose monitors and testing supplies are available over the counter, ask your health insurance company if a prescription is required for reimbursement.

You have made the right decision to buy a blood glucose monitor. Monitoring your blood glucose is very important in managing your diabetes, so take the time and ask questions to make sure you choose the monitor that best suits your needs.

## Data Management Systems

The introduction of blood glucose monitors has helped people take control of their diabetes. The development of data management systems that are compatible with the monitors make the job of tracking diabetes care much easier. These data management systems can record various aspects of your diabetes control every time you perform a blood glucose test. They can also store hundreds of glucose test results as well as other information, depending on the system, such as the time and date of your results, insulin types and doses, meals and exercise.

Another benefit of data management systems is that the blood glucose levels stored in your monitor can be transferred to a computer and plotted on a graph, which will allow you and your diabetes health care provider to see what your blood glucose control has been over a certain period of time. Also, if your health care provider has a computer that is compatible with your blood glucose monitor's data management system, your health care provider can download your information to assist with designing a plan for improving your treatment.

If you are looking to buy a data management system, here are a few tips to help you decide on which system to buy.

**Compatibility.** You want to make sure the data management system you buy is compatible with your blood glucose monitor, your computer and/or your diabetes health care provider's computer. Compatibility means that the two systems are able to "speak" the same language (i.e., they are able to "talk" to one another).

**Convenience.** Some data management systems are already included in the blood glucose monitor; others have to be connected to the monitor. If you do not want to keep track of two separate units, buy a data management system that is combined with a monitor.

**Ease of use.** Some data management systems may be harder to use than others. If possible, test several systems before buying to see how easy they are to use. Your diabetes health care team is also a good resource for providing recommendations on the systems. Try to buy a data management system that is easy for you to use and meets your needs. You will be more eager to use the system and thus get the most out of monitoring your blood glucose levels.

**Type of records.** Type of records. Talk with your diabetes health care provider about what information of your treatment plan he or she needs you to keep track of. This will help you in deciding on a data management system. For some health care providers, tracking of glucose levels with the date and time may be sufficient. For other health care providers, they may also want information on insulin dosages, diet and exercise recorded. It is important to know all your needs before buying a system.

**Expense.** Data management systems can be costly, depending on the components of the system you decide to buy. These systems are not requirement, so you will need to determine what you can afford based on what your needs are.

Data management systems can simplify the process of gathering and reviewing information about your diabetes care. If you decide to buy one of these systems, do the research to find a system that you will be happy with. Below is a table of blood glucose monitors that have the capability of interacting with computer software. The manufacturer's Web sites and customer service numbers are also provided.

<b>Abbott Laboratories MediSense Products</b>	<b>LifeScan</b>
Monitors: Precision Xtra; Sof-Tact	Monitors: In Duo; OneTouch (Basic, Profile, Ultra, UltraSmart, SureStep)
www.MediSense.com 1-800-527-3339	www.lifescan.com 1-800-227-8862
<b>Bayer HealthCare LLC, Diagnostics Division Ascensia Products</b>	<b>QuestStar Medical, Inc.</b>
Monitors: Ascensia Breeze, Elite; Elite XL; Dex 2	Monitor: Focus
www.bayercaresdiabetes.com 1-800-348-8100	www.queststarmedical.com 1-800-525-6718
<b>BD</b>	<b>Roche Diagnostics</b>
Monitors: BD Latitude DMS, BD Logic BGM	Monitors: Accu-Chek (Active, Compact, Complete, Advantage)
www.BDdiabetes.com 1-888-232-2737	www.accu-chek.com 1-800-858-8072
<b>Home Diagnostics, Inc.</b>	<b>TheraSense</b>
Monitor: Prestige	Monitors: FreeStyle; FreeStyle Tracker
www.prestigesmartssystem.com 1-800-342-7226	www.TheraSense.com 1-888-522-5226

## **Blood Glucose Monitoring Supplies**

When using a blood glucose monitor, you will need the following supplies:

- Test strips
- Sugar control solution
- Lancets or small needles for pricking your finger
- Lancet device to make pricking easier
- Cotton balls to stop the bleeding

It is important to make sure you get test strips that are compatible with your monitor. Not all test strips work in all monitors. Check the packaging of the test strips to make sure your monitor is listed as compatible with the test strips.

For a comparison chart of blood glucose monitors, data management systems and monitoring supplies, visit the American Diabetes Association Web site at [www.diabetes.org](http://www.diabetes.org).

## **Using a Blood Glucose Monitor**

Blood glucose monitors can work differently from one another. It is important you know how to use your monitor. Your diabetes health care provider should instruct you on how to test your glucose using the monitor and should also watch you to make sure you are doing it correctly. Training is also available through diabetes education programs that your diabetes health care team can direct you to. You can also contact the American Diabetes Association at [www.diabetes.org](http://www.diabetes.org) for more information on these diabetes education programs.

Before testing your blood glucose make sure you read the instructions with your monitor carefully. Below are general instructions for using a blood glucose monitor:

1. Wash your hands with soap and warm water and dry completely, or clean the area with alcohol and dry completely.
2. Set up your blood glucose monitor for testing. Make sure to read and follow the instructions carefully.
3. Remove a test strip from the container. Cover the container to protect the other test strips from light and moisture.
4. Choose the spot you are going to test from. Don't test on the same finger each time. Choose a different finger each time you check your glucose
5. Prepare the lancet and finger-pricking device. Like monitors, each finger-pricking device is different. Read and follow the instructions carefully. Use a clean lancet for each finger stick.

Once you have gone through these steps you are ready to test your blood by following the steps below:

1. Place the finger-pricking device with the lancet against your fingertip and push the button. Prick the side of your fingertip instead of the top as this is less likely to cause pain and bruising.
2. Hold your hand down squeezing the finger until a small drop of blood appears. If you have trouble getting a drop of blood out, hang your hand below your waist for a few minutes gently shaking or squeezing the finger. This will pool the blood into your finger making it easier to get a good size drop of blood. If you are still having trouble, talk with your diabetes health care provider about recommending a different lancet or finger-pricking device.
3. Catch the drop of blood with the test strip and follow the instructions for inserting the test strip and using the blood glucose monitor.
4. Read and record the test result. A logbook should be used for recording results and other important information.

The U.S. Food and Drug Administration (FDA) requires instructions for use to be included with all blood glucose monitors and test strips. Be sure to carefully read the instructions for both before using. Instructions for using the monitor are located in the user manual. Also, when there is a problem with the monitor, test strip or blood sample, the monitor will display error codes. The manual will tell you what these error codes mean and how to fix the problem. Make sure to always keep the manual with your blood glucose monitor.

Common errors or problems that can cause inaccurate readings include a monitor that is old, dirty or stored under extreme climate; hands that are not clean or dry; a blood sample that is too small or the test strips are outdated. Also, if the codes on your monitor and test strips do not match, this will result in a poor reading. Make sure your monitor is calibrated to the test strips you are using.

There are additional sources that can provide you with information on your monitor and test strips. The monitor's user manual should have a toll free number and the manufacturer of the monitor should have a website to assist with questions or problems. Make sure to also check the manufacturer's website periodically for any listing of issues with your monitor. Your diabetes health care provider can also assist with questions or problems.

Read instructions carefully before using all blood glucose monitors and supplies.

## Recording Test Results

Blood glucose readings should always be recorded in a log to help you manage your diabetes throughout the day and from day to day. Record keeping of test results is just as important as monitoring your blood glucose. Keep a written log of your blood glucose test results, even if you monitor has a memory. Having a monitor with memory will help in storing the results for when you have time to record them in a written log.

Below is a sample of a blood glucose monitoring log you may use to keep track of your glucose levels, medications, exercise and other information.

Daily Diabetes Log								Week of:		
	Other Blood Glucose	Breakfast Blood Glucose	Medicine	Lunch Blood Glucose	Medicine	Dinner Blood Glucose	Medicine	Bedtime Blood Glucose	Medicine	Notes (special events, sick days, exercise)
Monday										
Tuesday										
Wednesday										
Thursday										
Friday										
Saturday										
Sunday										
Testing Times*				Target Blood Glucose Level*				Your Blood Glucose Goal^		
Before meals (preprandial)				90 to 130 mg/dL				_____ to _____		
1-2 hours after the beginning of meals (postprandial)				<180 mg/dL				< _____		
At bedtime				100 to 140 mg/dL				_____ to _____		

Establish blood glucose goals with your diabetes health care provider so you can see how if your self-monitoring glucose levels are meeting these goals. To assist your diabetes health care provider in managing your diabetes, you should always share your readings with your diabetes health care provider by bringing your log with you to each visit.

### Important Features of Blood Glucose Monitors

The features of blood glucose monitors may vary. You need to know the features of your monitor so you can effectively use your monitor and understand its results.

**Measurement range.** Most monitors read glucose levels over a broad range of values from as low as 0 mg/dL to as high as 600 mg/dL. The range varies among monitors so you need to interpret very low or high readings carefully. If you do get a very low or high value, try to confirm this value with a second reading and also check the calibration of your monitor.

**Display of low and high values.** Your monitor will let you know when your glucose readings are low or high. You need to learn how low and high values are displayed on your monitor. You need to also understand what these low and high values mean to determine if any action needs to be taken to get the level close to normal. You and your diabetes health care provider should have a plan in place for what actions need to be taken if your glucose reaches levels that are too low or too high.

**Whole blood glucose vs. plasma glucose.** Blood glucose monitors measure glucose in whole blood. Most laboratory (lab) tests measure glucose in plasma (one of the components of blood). Plasma glucose levels are usually 10-15% higher than glucose levels in whole blood (and can be even higher after eating). Today, many monitors have a built in algorithm that converts whole blood glucose measurements to plasma equivalent glucose measurements to allow you to easily compare your lab glucose measurements to your self-monitoring glucose measurements. Make sure you and your diabetes health care provider know if your monitor gives results as "whole blood equivalent" or "plasma equivalent."

**Cleaning.** Most monitors require some type of cleaning. Some actually need to be cleaned regularly to give accurate results. Others may not need regular cleaning, but will give an electronic alert when a cleaning is needed. Other monitors may require that they be cleaned only by the manufacturer. Check your monitor's user manual on how to clean your monitor and how often it

should be cleaned. If your user manual says you can clean your monitor, use a soft cloth that is dampened with soap and water to prevent damage to sensitive parts. Do not use alcohol (unless recommended by the manufacturer), cleaners with ammonia, glass cleaners or abrasive cleaners. Make sure to follow the instructions for cleaning your monitor noted in the user manual.

### **Perform Quality Control Checks**

You need to perform regular quality control checks on your blood glucose monitor based on the manufacturer's instructions. This is to make sure your glucose readings are accurate and reliable. A number of things can affect the accuracy of your readings, such as if the monitor was dropped, the electrical components on the monitor have worn out or the test strips have been damaged by heat or humidity. Changes in your testing technique can also affect your glucose readings. In general, there are two types of quality control checks to test the operation of your monitor.

**Test quality control solutions.** This method checks the accuracy of your monitor and test strips, and may also indicate if you are using your system properly. When testing your monitor with a quality control solution, follow the instructions provided with the solution. The instructions will direct you to place a certain amount of solution on a test strip and then run it through your monitor just as if you were using your blood to check your glucose. Because test quality control solutions are associated with glucose values, the monitor will provide you with a reading of the amount of glucose in the control solution sample. Compare this number to the number noted on the test quality control solution labeling. If the numbers match, your system (monitor and test strips) is working properly. If the numbers do not match, the system may not be working properly and you will need to contact the manufacturer for further instruction.

**Electronic controls.** This method only checks if the monitor is operating properly. When testing your monitor with an electronic control, you place a cartridge (special control test strip) in the monitor and a signal will be displayed to indicate if the meter is working properly. If the meter is not working properly, you will need to contact the manufacturer for further instruction.

Test quality control solutions and electronic controls may be included with your monitor. If not, you should be able to obtain from the manufacturer of the monitor or from a pharmacy.

You need to also take your monitor to your diabetes health care provider so he or she can watch you test your glucose to make sure your technique is correct. Your health care provider will also take a sample of your blood to obtain a lab value of your blood glucose level in order to compare the blood glucose monitor results with the lab test results. If the results are comparable (within 15 percent), then you and your health care provider will know the monitor is working properly and your technique is correct. If the results are not comparable, your monitor may not be working properly or other factors may be affecting the performance of your monitor. Discuss this with your health care provider and contact the manufacturer if needed.

### **Factors That May Affect Your Blood Glucose Monitor**

If your test results are inaccurate, you should consider other factors that may be affecting your monitoring system and the results.

**Hematocrit.** This is the amount of red blood cells in the blood. If your hematocrit is high, your blood glucose level may test lower than people with normal hematocrit. If your hematocrit is low, your blood glucose level may test higher than people with normal hematocrit. If your hematocrit is abnormal, such as with anemia and sickle cell anemia, discuss its possible effect on your glucose readings with your diabetes health care provider. If you do not know what your hematocrit value is, discuss this with your doctor.

**Other substances.** There are other substances, such as uric acid (a natural substance found in the body that may be higher than normal in people with diabetes), glutathione (an anti-oxidant known as GSH) and ascorbic acid (vitamin C) that may affect your blood glucose readings. Check the package insert or user manual to see what substances may affect your monitoring system and the accuracy of its testing. Talk with your diabetes health care provider about these substances and the possibility of them interfering with your test results.

**Temperature, humidity and altitude.** These may also affect the accuracy of your results. Read the information with your monitor and test strips to see if temperature, humidity or altitude may affect their performance. Make sure to follow the instructions for properly storing and handling your monitor and test strips.

**Generic test strips.** Generic or third-party glucose reagent strips are test strips developed as less expensive alternatives to the test strips developed by manufacturers of the monitors. These generic test strips are made specifically for the monitors listed on the package; however, they may look similar to strips used for other monitors. When buying these generic or third-party test strips, make sure to buy the ones that are compatible with your monitor.

Manufacturers may change their monitors and test strips and sometimes the makers of the generic test strips are not informed of these changes. This can result in the generic test strips not being compatible with your monitor even though their packaging states they are. The differences between test strips may include the amount, type or concentration of the chemicals (reagents) on the strip, or the size and shape of the strip. Monitors are sensitive to these differences and may not work properly if they are not used with the correct test strips. Contact the manufacturer of your blood glucose monitor if you are not sure whether a test strip will work with your monitor.

## Regulation of Blood Glucose Monitors

The U.S. Food and Drug Administration (FDA) reviews and approves all blood glucose monitors and test strips before they are made available to the public.

The FDA requires the manufacturers of the monitors to show their monitoring system provides acceptable accuracy and consistency of glucose measurement at low, medium and high levels of glucose as compared to monitors already on the market. The quality of a monitor's software is also important since it controls the testing, data storage and displays the user sees and uses when testing.

When reviewing blood glucose monitors for market, the FDA requests data from the manufacturer showing how well the monitor performed during studies of actual use. These studies make certain that users understand the labeling, achieve good results and do not experience problems that could affect their health. The FDA also considers factors that may interfere with testing results, such as prescription medications, over-the-counter medications and vitamin supplements.

The FDA has quality system regulations that require manufacturers of blood glucose monitors to follow the same quality standards each time. This assures that new monitors and test strips perform as good as older models.

The responsibility of the FDA does not stop once a blood glucose monitor enters the market. The FDA routinely inspects manufacturing facilities and gathers information on blood glucose monitors from manufacturers, health providers and consumers through its MedWatch program. All problems with medical devices, including blood glucose monitors, can be reported through MedWatch. General information about the MedWatch program and instructions for reporting problems can be found on the FDA Web site at [www.fda.gov](http://www.fda.gov).

## Alternative Site Testing

As mentioned previously, conventional blood glucose monitors require a drop of blood using a fingerstick while some of the newer monitors allow blood testing from alternative sites. These alternative sites may include the thigh, upper arm, forearm and base of the thumb.

Taking blood samples from these alternative sites may be desirable since the stick may cause less pain or bruising, but it may have limitations as well. Changes in glucose levels show more quickly in blood of the fingertips versus blood in other parts of the body. For example, after a meal, a dose of insulin or exercise, glucose concentrations change rapidly. The glucose levels in the blood of alternative sites seem to change more slowly than the glucose levels in the blood of the fingertips. As a result, glucose readings using blood taken from alternative sites may differ from the results using blood taken from the fingertips. This has raised concern with the FDA and the FDA now requests that manufacturers show their device is not affected by the differences in glucose levels of blood samples during times glucose levels are rapidly changing, or that the manufacturers alert users about the possible differences in values during these times.

The FDA recommends labeling precautions include the following statements:

- Alternative site results may be different than the fingertip when glucose levels are changing rapidly (e.g. after a meal, taking insulin or during or after exercise).
- Do not test at an alternative site, but use samples taken from the fingertip, if
  - you think your blood sugar is low,
  - you are not aware of symptoms when you become hypoglycemic, or
  - the site results do not agree with the way you feel.

Talk to your diabetes health care provider about the advantages and disadvantages of using conventional monitors using a fingerstick versus monitors that allow alternative site testing.

## New and Future Technology

Researchers are always looking into new technologies for glucose testing that does not require fingersticks. The blood glucose monitors that allow for alternative site testing was already mentioned; however, recent advances have developed blood glucose monitors that are considered minimally invasive (minimally punctures the skin for a blood sample) and noninvasive (does not puncture the skin for a blood sample).

The minimally invasive blood glucose monitor, called MiniMed Continuous Glucose Monitoring System, consists of a small plastic catheter (small tube) that is inserted just under the skin. The catheter collects small amounts of blood that is passed through a biosensor to measure the amount of glucose. The device collects measurements over a 72-hour period and then these measurements must be downloaded by the consumer or health care provider to show trends on glucose levels over time. This allows people with diabetes to know the best time to do their standard fingerstick tests. MiniMed should only be used for occasional use and to show trends in glucose levels during the day. This monitor does not provide readings for individual tests and thus cannot be used for day to day monitoring.

The noninvasive blood glucose monitor available is known as the Cygnus GlucoWatch Biographer. The GlucoWatch is worn on the wrist and it pulls tiny amounts of fluid from the skin using small electric currents. It measures the glucose in the fluid without puncturing the skin and thus is painless. This device must be worn for 3 hours to warm up before it can take a measurement.

Once ready, it can give 3 measurements per hour for 12 hours. The GlucoWatch displays results that can be read by the wearer. The results of the GlucoWatch is useful to show trends and patterns in glucose levels and does not report one result by itself. This device can be used for detecting and evaluating episodes of hyperglycemia (high blood glucose) or hypoglycemia (low blood glucose). However, you must confirm the results of the GlucoWatch with a standard blood glucose monitor using a fingerstick before you take corrective action.

A prescription from a physician is required for the MiniMed and the GlucoWatch. Both of these devices are used to obtain additional glucose levels between fingerstick tests and thus do not replace standard blood glucose monitoring. Both devices also require daily calibration using standard fingerstick glucose testing and both continue to be studied to find the best way to use these devices for diabetes management.

Future technology researchers are looking at include:

- Shining a beam of light onto the skin or through the body tissue.
- Measuring energy waves (infrared radiation) emitted or released from the body.
- Applying radio waves to the fingertips.

You have made the right choice to use a self-monitoring blood glucose device to help you and your diabetes health care provider better control your blood glucose levels. Research has shown that self-monitoring of blood glucose is an important component of a treatment plan and is an effective tool in helping people with diabetes stay healthy.

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***MaxorPlus***, your pharmacy benefit management provider, and your employer are working together to help ensure that you are provided with excellent, cost-effective and relevant medications as well as medical information to help meet your healthcare needs. — *MaxorPlus Clinical Pharmacy Department*