FreeStyle Libre

For Safe and Effective Diabetes Management

ENDOCRINE SOCIETY

How FreeStyle Libre Works

FreeStyle Libre is a system for continuous glucose monitoring (CGM) that gives you easy access to your glucose numbers. CGM has been shown to help people keep blood glucose in their target range and reduce episodes of severe low blood sugar (hypoglycemia). This can mean fewer health problems, day-to-day and in the long run.

CGM: A Different Way to Monitor Glucose

The most common way to check blood glucose levels is to prick a finger to get a drop of blood (a fingerstick), then test the blood with a blood glucose meter. The results are used to make decisions about insulin, food, and exercise.

FreeStyle Libre systems use a sensor to test a thin layer of fluid between body cells. No blood sample is needed. These "sensor glucose readings" are taken once a minute and can be read with a simple swipe of a wireless reader. Sensor glucose readings tend to be about 5 to 10 minutes behind blood glucose readings. Even so, sensor glucose readings can replace fingerstick readings for most treatment decisions.*

*The FreeStyle Libre reader contains a blood glucose meter that can be used for fingerstick readings. Do fingersticks before making treatment decisions when:

- The check blood glucose symbol appears
- You have symptoms that do not match system readings
- You suspect the readings may not be accurate
- You have symptoms that may be due to high or low blood glucose
- Your glucose is quickly rising or falling (more than 2 mg/dL per minute)

FreeStyle Libre consists of two parts: A sensor and a touchscreen reader.

The disposable sensor is worn on the back of your upper arm. It automatically monitors your glucose throughout the day and night. It is small (about the size of 2 stacked quarters) and water-resistant for swimming, bathing, and exercise. Each sensor lasts up to 14 days (depending on the system) before needing to be replaced. The sensor holds a full 8-hour history of your glucose results.

The wireless, rechargeable reader is used to painlessly scan the sensor. This can be done quickly and discreetly, even through clothing. The reader holds up to 90 days of glucose information.

With each scan, the reader screen shows your current glucose reading, a graph showing the past 8 hours of your glucose history, and a trend arrow showing whether your glucose is rising, falling, or staying steady.

Understanding Trend Arrows

What the Trend Arrow Tells You

The trend arrow tells you how quickly or slowly your glucose is changing, and in what direction. There are **5 possible arrow results.***

Glucose rising quickly

Glucose rising

Glucose changing slowly

Glucose falling

Glucose falling quickly

After each scan, the Sensor Glucose Readings screen appears. The screen shows your current glucose reading, a graph of your past 8 hours of glucose history, and a glucose trend arrow.

*If the system cannot tell the direction of your glucose, it will not show an arrow. Instead it will show the check blood glucose symbol:

If that symbol appears, check your blood glucose and use the result to make any needed treatment decisions.

Note: When you first start using the FreeStyle Libre system, use only blood glucose readings to make treatment decisions. Scan often to get a sense of how food, medication, exercise, and other factors affect your sensor glucose readings. When you have a good understanding of how the system works for your body, you can start using sensor glucose readings for treatment decisions.

Using Trend Arrows to Help Make Treatment Decisions

Because the trend arrows help show what direction glucose is going, they can be used to help make decisions about your treatment. Treatment decisions based on trend arrows may include:

- Adjusting your insulin dose
- Eating a snack
- Using fast-acting carbohydrates
- Doing nothing and scanning to monitor changes

Adjusting Insulin Dose for Adults Using Trend Arrows: Before Meals and 4+ Hours After Meals

Mealtime is ideal to begin applying insulin dose adjustments using trend arrows. The following table gives you information on using trend arrows to help adjust your insulin dose before and several hours after meals.

Your insulin dose is based on your food, your correction factor, and your trend arrow adjustment. Adjusting your dose using the trend arrows does not replace your standard care plan, including carb counting and related adjustments. Be sure to follow the treatment plan you and your healthcare provider have outlined.

What to Know

This table is for adults who require insulin to manage diabetes and who are taking rapid-acting insulin for meals and corrections.

- Insulin adjustments using trend arrows do not replace standard calculations using insulin-to-carbohydrate ratio and correction factor. These adjustments are increases or decreases of rapid-acting insulin in addition to calculations using insulin-to-carbohydrate ratio and correction factor.
- For quickly rising sensor glucose ↑ before a meal, consider administering insulin 15 to 30 minutes before eating.
- For quickly falling sensor glucose ↓ before a meal, consider administering insulin closer to the meal.
- If quickly falling sensor glucose ↓ is close to or lower than 150 mg/dL, consider not taking your pre-meal insulin dose until glucose has stabilized.
- If you are of older age or are in poor health, you may be given revised instructions to help better reduce your risk for low blood sugar (hypoglycemia). If this might apply to you, talk with your healthcare provider.
- When rounding of the insulin dose is needed:
  - Calculate total insulin dose using usual parameters.
  - Round to the nearest whole number or half unit, as appropriate.
  - If at a midpoint (for example, 0.5 units) and you need to round to a whole number:
    - Round up when a level or upward arrow is present.
    - Round down when a downward arrow is present.

Insulin Dose Adjustments Using the FreeStyle Libre System Trend Arrows in Adults: Pre-Meal and Corrections 4 or More Hours Post-Meal

Insulin Dose Adjustments

FreeStyle Libre Trend Arrows	Correction Factor (CF)*			
	Less than 25 (<25)	25 to less than 50 (25 to <50)	50 to less than 75 (50 to <75)	75 or higher (≥75)
↑	+3.5 units	+2.5 units	+1.5 units	+1.0 units
↗	+2.5 units	+1.5 units	+1.0 units	+0.5 units
→	No adjustment	No adjustment	No adjustment	No adjustment
↘	-2.5 units	-1.5 units	-1.0 units	-0.5 units
↓	-3.5 units	-2.5 units	-1.5 units	-1.0 units

*Correction factor (CF) is in mg/dL and indicates glucose lowering per unit of rapid-acting insulin.

Special Considerations When Using CGM

Exercise

Being active is good for your health, but it does affect your blood glucose level. Plan ahead as much as possible to help avoid low blood sugar (hypoglycemia). It is often a good idea to avoid exercise until 2 hours after taking a bolus dose of insulin. This will help keep glucose from changing quickly.

Delayed low blood sugar sometimes occurs about 6 to 8 hours after exercise. Watch for this by scanning more often. Work with your healthcare team to develop a plan for managing glucose during very intense exercise or exercise lasting longer than 2½ hours.

<100 mg/dL	100 – 180 mg/dL	181 – 250 mg/dL	>250 mg/dL
DO NOT Exercise Ingest carbohydrate and/or wait until >100 mg/dL	**Carefully Exercise** Re-scan every 30 minutes to avoid low blood sugar	**Exercise Away** Re-scan every 30 minutes to avoid low blood sugar	**DO NOT Exercise** Correct and/or wait until ≤250 mg/dL
↑ Wait until > 100 mg/dL	↑ Rescan in 30 min	↑ Rescan in 30 min	↑ Correct to ≤180 mg/dL
↗ Wait until > 100 mg/dL	↗ Rescan in 30 min	↗ Rescan in 30 min	↗ Correct to ≤180 mg/dL
→ Ingest 15 g carbohydrate	→ Consider ingesting 15 g carbohydrate	→ Rescan in 30 min	→ Correct to ≤180 mg/dL
↘ Ingest 15 g carbohydrate	↘ Consider ingesting 15 g carbohydrate	↘ Rescan in 30 min	↘ Wait until ≤250 mg/dL
↓ Ingest 30 g carbohydrate	↓ Consider ingesting 30 g carbohydrate	↓ Consider ingesting 15 g carbohydrate	↓ Wait until ≤250 mg/dL

If You're Sick

Illness can make it hard to keep your blood sugar in your target range. Your blood sugar can rise quickly when you're sick. Keep these recommendations in mind for using CGM on sick days:

- Scan more often.
- In addition to scanning, do a fingerstick and check your blood glucose every 2 to 4 hours.
- Monitor ketones as you have been instructed.

Be sure to talk with your diabetes healthcare team and develop an action plan for sick days. This includes how to adjust your meal plan and insulin.

Aspirin and Vitamin C

Taking 650 mg or more of aspirin (or any pain reliever containing salicylic acid) can affect sensor glucose levels. So can 500 mg or more of vitamin C. If you take this much or more of either substance, check your blood glucose in addition to scanning.

Avoid Insulin Stacking

If your most recent scan shows that your glucose is high and still rising, you may be tempted to take more insulin to lower it. However, if you've recently taken a bolus of insulin, taking another too soon (insulin stacking) can result in low blood sugar (hypoglycemia). The right treatment for high and rising glucose depends on several factors, including when you last took insulin and your recent activity. The best decision may be to do nothing right now and scan again a bit later.

How Often to Scan

Scanning with the FreeStyle Libre system is easy and quick. Because of this, you might be tempted to scan more often than you need to. You may then feel overwhelmed by data. On the other hand, scanning only a few times a day may cause you to miss important information. This page gives general recommendations for how often to scan. Certain factors and situations may mean you need to scan more often.

When to Scan	Why?
Mornings after waking up	Gives you an overview of your glucose trends overnight. Allows you to make adjustments to stay in target range.
Just before a meal	Gives you information for making calculations of insulin dose and timing.
Two hours after a meal	Gives you an overview of the glucose changes after your meal. Allows you to take action to correct glucose, if needed.
Before going to bed	Gives you current sensor glucose and trend arrow information. Lets you take action to help prevent blood sugar going too low or too high during the night.

Other Scanning Recommendations

- **On sick days:** Scan every 2 hours.
- **For exercise:** Scan before exercise and every 15 to 30 minutes during exercise. Scan right after stopping exercise and again 6 to 8 hours later.
- **If you have taken action to treat an episode of high blood sugar (hyperglycemia):** Scan at least once every hour for the next 4 hours. Check that glucose goes back to target range and doesn't go too low.
- **If you have taken action to treat an episode of low blood sugar (hypoglycemia):** Scan every 15 minutes until your glucose is steady within your target range. Follow your treatment plan regarding when to take more action if your glucose continues to stay low.
- When the trend arrow is flat and sensor glucose is close to the low end of your target range, scan more often for a time to help avoid low blood sugar.

Scan at least every 8 hours. This prevents a gap in glucose data, since the sensor only holds 8 hours of information.

Questions for Your Healthcare Team About CGM

- Is CGM right for me?
- Does CGM fit into my diabetes management plan?
- Would CGM help me better manage my diabetes?
- What adjustments would we need to make to my diabetes management plan to use CGM?
- What is my target blood glucose?
- How often should I scan?
- How do I share my sensor data with you?
- Is CGM covered by my insurance plan?

You have questions. We have answers.

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