What you need to know about Continuous Glucose Monitoring

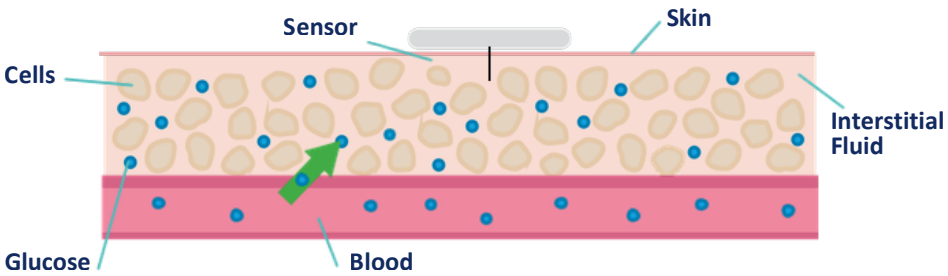
What is CGM?

Continuous Glucose Monitors (CGMs) are devices which comprise of a small sensor that sits beneath the skin, providing a continual monitoring of the body's glucose levels. They can be seen from an external perspective as a little 'patch' worn on the skin, however underneath there is a small biosensor that picks up glucose readings from the interstitial fluid.

What is Interstitial Fluid?

Interstitial fluid is the fluid found between cells. So CGMs, unlike traditional blood glucose meters, don't test the glucose in the blood itself but instead the glucose that is present around the surrounding tissue.

See below, a cross section of how a CGM interacts with its surroundings:



Glucose is transported around the body via the blood vessels and passes into the interstitial fluid on its journey into the body cells where it is used as an energy source.

Why use CGM?

CGM gives users glucose levels throughout the day, reducing the need for finger-pricking. Many people living with diabetes choose to use CGM as it gives them access to a lot more readings that they may have otherwise missed, whilst being discreet and hidden beneath clothing in most cases.

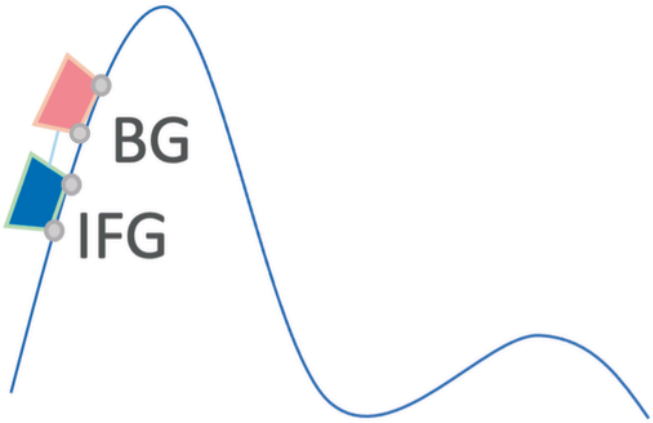
With CGM, users can benefit from alarms that will notify them that their glucose levels are going out of range, so that they can make treatment decisions quicker. As well as being able to see real time glucose trending information to further enhance their diabetes management

Difference between Blood Glucose & CGM Readings

The difference between blood glucose and interstitial fluid glucose testing is a multi-faceted comparison but it's agreed that CGM brings a level of ease to testing. It is also safe, practical and convenient for many patients who are now choosing to use it as their main glucose monitoring choice.

Interstitial fluid glucose and blood glucose values are highly correlated and can both be used for diabetes management to help make treatment decisions. However, it is important to remember that interstitial fluid glucose and blood glucose are not the same thing; glucose flows from the blood into the interstitial fluid.

The rollercoaster model provides an easy and simple explanation for this:



As blood glucose levels rise and fall, the interstitial fluid glucose follows closely behind. There tends to be a lag time of anywhere from 5 to 15 minutes; but many things can affect this! This difference in glucose readings is known as physiological lag time. This lag time should always be accounted for (especially at times of rapid change) when taking a blood glucose reading and comparing it to an interstitial fluid glucose value.

Blood glucose meters have been considered the 'Gold Standard' for many years, and this hasn't changed as such, as it is often advised that patients clarify their CGM readings with blood glucose tests. CGM, on the other hand, gives a better overall perspective of what is exactly happening over a longer period of time, with trending information.

CGM Components

Difference between Blood Glucose & CGM Readings

Most CGM systems comprise of 3 main components:

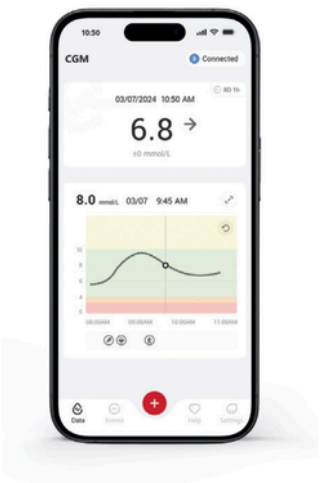
Sensor

A thin, needle-shaped, flexible, metallic filament. It works similarly to a blood glucose sensor- an enzyme in the sensor reacts with the glucose in the interstitial fluid.

Once below the skin, the sensor reacts with the surrounding glucose molecules; generating a minuscule electric current. This current travels up the base of the sensor to the skin surface where it connects to a transmitter.

Transmitter

The transmitter is what you can mostly see externally and is often inbuilt with the sensor itself. It contains its own power source and a radio transmitter- which allows it to be the bridge between IFG readings and your receiver.

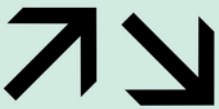
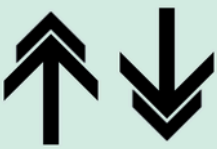


Receiver

Traditionally either a dedicated handset or a smartphone app. CGM receivers display a variety of important real-time information, including trend graphs covering recent time intervals; trend arrows indicating the current direction the glucose is headed; and the latest value generated by the sensor.

Trend Arrows

With real time CGM, the user can benefit from in the moment trending information through Bluetooth technology. This allows the user to make more educated clinical decisions based on not only a glucose reading but a direction of travel for their readings. See the graph here for examples of the GlucoMen iCan Trend Arrows.

Trend Arrow	What it means
	**Steady** Glucose is changing but less than 0.16 mmol/L per 3 minutes
	**Rising or Falling slowly** Glucose is changing slowly, more than 0.16 mmol/L or up to 0.33 mmol/L per 3 minutes.
	**Rising or Falling quickly** Glucose is changing quickly, more than 0.33 mmol/L or up to 0.5 mmol/L per 3 minutes
	**Rising or Falling rapidly** Glucose is changing rapidly, more than 0.5 mmol/L per 3 minutes

Trend arrows based off GlucoMen iCanCGM

NICE Guidance

NG17 is the NICE Guidance that outlines the best practice in terms of the management ofpeople living with Type 1 diabetes. The NHS follows many guidelines outlined by NICE, but this may look different dependent on your locality or trust. However, the guidance is there to recommend the best practice of care for patients by choosing the most optimum care, but also the most cost-effective treatment.

Previously, NG17 advised access to CGM for people living with Type 1 diabetes via the use of Flash technology. However, as of April 2022 this has been revised.

The updated NG17 outlines that healthcare professionals should offer all patients living with Type 1 diabetes a choice of rt-CGM or flash glucose monitoring based on their individual preferences, needs, characteristics and device functionality. A decision should also be based on the most cost-effective option.

It is also notable that in the NG17 guidance, it still outlines that patients should have access to blood glucose testing and that patients are advised to test capillary glucose to calibrate their CGM devices accuracy from time to time.

NG28

NG28 is the NICE Guidance that outlines the best practice in terms of the management of people living with Type 2 diabetes.

NG28 isn't as wide reaching in its scope for CGM access as NG17, due to the nature of frequency of testing and cost effectiveness of CGM implementation for the wide range of patients living with Type 2 diabetes.

However, access is advised to those who:

- Arecurrently on a multipledaily insulininjectionregime
- Have recurrent or severe hypos
- Have impaired hypo awareness
- Have a condition or disability meaning they can't perform self-glucose but could potentially use flash glucose monitoring
- Are advised to self-test more than 8 times per day
- Require support from a care worker or healthcare professional to monitor their blood glucose

Although access to rt-CGM isn't currently available for all patients living with Type 2 diabetes, it is important to consider the impacts and implications for those who will be receiving CGM and live with Type 2 diabetes.

Flash vs Real Time CGM

As seen from the NICE guidance, there is a mention of an alternative form of CGM- 'Flash'. The fundamental difference between these two forms, are that Flash systems use Near Field Communication (NFC) Technology, whereas rt-CGMs utilise Bluetooth to communicate with the receiver. This means the sensor has to be scanned intermittently to gather data from flash systems- requiring an external factor to garner this information and through this reason means that certain functionality such as pump integration and predictive alerts aren't possible on these platforms.

Bluetooth technology however, allows for passive upload of data, leading to a more seamless experience.

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Why Menarini?

At Menarini Diagnostics, we provide a total testing solution for people with diabetes, including blood glucose and ketone meters, continuous glucose monitors and other diabetes consumables.

Our blood glucose meter, GLUCOFIX TECH GK, has a best in class set of features to make glucose testing easier. These include contactless download to free logbook and bolus advice apps, hypo/hyper alerts and an extra-large memory (730 results).

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