

What is Continuous Glucose Monitoring (CGM)?

CGM technology has helped many people with type 1 diabetes to better control their condition, by enabling them to self-monitor their glucose levels 24 hours a day.

Some research suggests CGM has potential for people with type 2 diabetes too.¹

There are two types of CGM: real-time, where glucose levels can be checked at any time as well as downloaded; and retrospective, where results can only be downloaded.

This is how real-time CGM works:

- A small, disposable, electro-chemical sensor is inserted just under the skin, to measure glucose levels in interstitial fluid.
- Transmitters attached to the sensor wirelessly send glucose readings every few minutes to a compatible device (smartphone, smart watch, or a receiver in an insulin pump). This provides information on glucose concentration, direction and the rate of change.
- This ability to view glucose level trends at a glance means CGM users can take action quickly to help lower their HbA1c levels, and reduce their risk of hypo- and hyperglycaemia.
- CGM devices like the Dexcom G6 also include alarms, to alert users when their levels soar too high or drop too low.
- CGM technology is suitable for people with diabetes who either administer their insulin through multiple daily injections or an insulin pump.

How is CGM different from routine self-monitoring of blood glucose?

Self-monitoring of blood glucose (SMBG) levels, with or without CGM, has been shown in many studies to improve glycaemic control for people with type 1 diabetes and type 2 diabetes. This helps them to make adjustments to diet, exercise and insulin doses, and prevent complications like hypo- and hyperglycaemia. Self-monitoring also helps healthcare professionals to prepare individualised treatment and management plans for their patients.

The main differences between SMBG and CGM are:

- SMBG blood glucose readings are taken by fingerstick tests. People with type 1 diabetes need to do this on average 7 times a day (80,000 times over a lifetime)². But with the latest factory-calibrated systems, fingerstick tests aren't needed.³
- Glucose data is more limited with SMBG, which gives a single snapshot of glucose levels. CGM gives constant glucose measurements, which helps users to identify trends and changes over time.
- CGM measures the glucose level of interstitial fluid rather than blood, which routine SMBG measures. The CGM readings will differ from blood glucose readings, particularly after eating or taking insulin, but trends in glucose readings are more important in CGM than individual readings.

What's the difference between real-time CGM and Flash Glucose Monitoring (FGM)?

Both use a sensor inserted under the skin to record glucose levels.

- CGM sends data and trends continuously to a device for reading
- FGM only gives readings and trends when the sensor is scanned.



NICE guidance on CGM

NICE guidance recommends that real-time CGM isn't offered routinely to people with type 1 diabetes. It supports the use of real-time CGM for:

Adults with type 1 diabetes who, despite optimised use of insulin therapy and conventional blood glucose monitoring, have:

- More than one episode of severe hypoglycaemia a year, with no obvious cause
- Complete unawareness of hypoglycaemia
- More than two asymptomatic hypoglycaemic events (hypos) a week, which affect their daily life
- Extreme fear of hypos
- HbA1c level of 75mmol/mol (9%) or higher that persists despite testing at least 10 times a day.

They should also be committed to using CGM at least 70% of the time and calibrating it as needed

Children and young people with type 1 diabetes who have:

- Frequent, severe hypos
- Unawareness of hypoglycaemia, with serious consequences, such as seizures or anxiety
- Inability to recognise hypo symptoms or tell someone about them
- High blood sugar levels despite lots of support and insulin adjustments

Full NICE guidance on CGM can be found at: www.nice.org.uk and search 'CGM'

What outcomes have happened so far to show the successes of CGM

- Studies have shown that, compared with routine self-monitoring of blood glucose, CGM can improve overall glucose measured by HbA1c, reduce exposure to hypoglycaemia, and does so independently of insulin delivery modality.
- In five clinical trials⁴⁻⁸, the use of Dexcom CGM technology has been proven to lower HbA1c, reduce the risk of hypoglycaemia, increase the time spent in range, and improve quality of life and well-being.

How can people with type 1 diabetes get hold of CGM technology?:

- NICE advises that real-time CGM should be provided by a centre with expertise in its use, as part of strategies to optimise a person's HbA1c levels and reduce the frequency of hypoglycaemic episodes.
- The NHS can provide funding for CGM for people with type 1 diabetes who meet NICE criteria (and use MDI therapy or a pump) but there is no obligation for funding to be granted. Users need to have used routine self-monitoring of blood glucose, and commit to using CGM at least 70% of the time.

There is no national funding pathway for CGM through the NHS. People with type 1 diabetes are encouraged to talk to their healthcare professional about what they can do to access funding for a CGM system.

The alternative is self-funding – Dexcom, for example, offers a Subscribe and Save plan for full-time wear at £150 a month. A starter kit is also available.

Where can I find out more about CGM

The following guides from diabetes charities JDRF and INPUT provide some further insights into CGM technology and use:

- <https://jdrf.org.uk/information-support/treatments-technologies/continuous-glucose-monitors/>
- <http://www.inputdiabetes.org.uk/wp-content/uploads/2016/10/Type1techAdults.pdf>
- <http://www.inputdiabetes.org.uk/wp-content/uploads/2016/10/Type1techCYPupdate.pdf>
- Dexcom website: <https://www.dexcom.com/en-GB>

References

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2. <https://jdrf.org.uk/information-support/about-type-1-diabetes/facts-and-figures/>
3. Wadwa RP, Laffel LM, Shah VN, Garg SK. Accuracy of a Factory-Calibrated, Real-Time Continuous Glucose Monitoring System During 10 Days of Use in Youth and Adults with Diabetes. *Diabetes Technol Ther.* 2018.
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6. Heinemann L, et al. HypoDE. *Lancet.* 2018.
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