Continuous Glucose Monitoring (CGM): The Basics

Continuous glucose monitoring (CGM) allows people to see glucose readings 24 hours a day while doing few or no fingerstick tests. CGM uses a small wearable device to measure interstitial glucose (glucose that has left the blood and moved into the tissues).

Interstitial glucose readings are “older” than blood glucose readings by 5-15 minutes. This lag in time varies and can be longer after eating or after treating a low blood sugar. Therefore, CGM results don’t always match fingerstick blood glucose readings.

How CGM Works

A glucose sensor (small electrode) is inserted under the skin and measures interstitial glucose every 1-5 minutes. The readings are sent wirelessly to a device, either automatically or by manually scanning the sensor with a reader. There are two major types of CGM.

Types of CGM

Real-time CGMs (rtCGM e.g. Dexcom and Medtronic) have a transmitter attached to the sensor to continuously send glucose results to a reading device. Dexcom sends results to a receiver or smartphone app. Medtronic sends results to a Medtronic insulin pump. Each can be programmed to alarm when glucose levels reach certain limits. Fingerstick testing is needed to calibrate rtCGMs at least twice daily and at other times.

Intermittently viewed CGM (iCGM or Flash e.g. Abbott’s Libre) has no additional transmitter piece. The user manually scans the sensor with a handheld reader to see current and stored results. Fingerstick testing is not needed for calibrations but is needed at other times.
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Benefits

- CGM may improve diabetes control. It can help people find glucose patterns and make daily management decisions. The glucose readings from some CGM (Dexcom, Libre) are approved for use in calculating insulin doses.

- CGM provides more information than fingerstick tests. CGM provides a current glucose reading, a graph of previous hours’ glucose level and rate of change (ROC) arrows. A reading of 5.2 mmol/L ↓↓ (dropping quickly) would likely require action to prevent a low, whereas a 5.2 mmol/L → (stable) might not.

Challenges

- Some challenges of CGM include cost, alarm fatigue, feeling overwhelmed by data (this could lead to too many insulin adjustments), unrealistic expectations, skin irritation and still needing fingerstick glucose tests for some situations (all brands).

- Another challenge is remembering that sensor glucose (SG) readings can lag behind blood glucose (BG) readings at times.

Brands

1. Abbott’s Libre [https://myfreestyle.ca](https://myfreestyle.ca)
   - 2018 approximate pricing: $89 per sensor (2 weeks; no off-label re-use is possible) plus purchase of one reader ($49).

2. Dexcom G5 [www.dexcom.com](http://www.dexcom.com)
   - 2018 approximate pricing: $86 per sensor (7 days; off-label re-use is possible) plus purchase of 3-4 transmitters/year each $389 or subscription of $89/month.

3. Medtronic CGM (for use with Medtronic pump) [https://www.medtronicdiabetes.ca](https://www.medtronicdiabetes.ca)
   - 2018 approximate pricing: $65 CAD per sensor (6 days; off-label re-use is possible). Medtronic insulin pump with transmitter is required.