

Small

THE USE OF FLASH GLUCOSE MONITORING SYSTEMS IN CATS

Rachel Korman BVSC MANZCVS (Int Med) FANZCVS (Fel Med)
 CVE Feline DE tutor
luckykorman@gmail.com

C&T No. 58

Continuous glucose monitors (CGM) are great for hospitalised cats requiring intensive glucose monitoring and for previously diagnosed diabetic patients. These monitoring systems are particularly useful in cats where frequent blood sampling can be difficult and patients can be discharged with sensors for assessment of glucose trends in their home environment.

The FreeStyle Libre (Abbott) is a flash glucose monitoring system which measures interstitial glucose every minute and stores data for up to 14 days. The system has been validated in dogs but not yet in cats (S. Corradini, 2016 Jul-Aug). In dogs, good correlation between interstitial glucose and plasma glucose concentrations has been demonstrated and it was accurate at low, normal and high blood glucose concentrations. The monitor has also been evaluated in 14 dogs with diabetic ketoacidosis (DKA) (Malerba, *et al*, 2020). It demonstrated clinically accurate estimates of blood glucose. Acid-base status, beta-hydroxybutyrate, lactate concentrations and body condition scoring did not influence sensor accuracy.

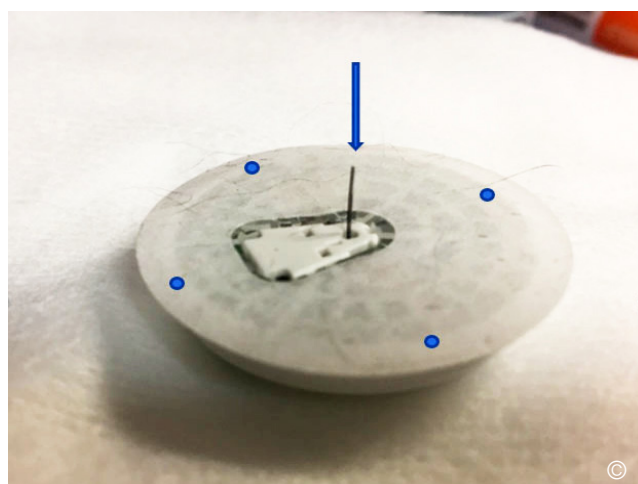


Figure 1. Underside view of a Freestyle Libre sensor. The blue circles represent sites for placement of superglue to hold the sensor in place. The blue arrow denotes the thin, flexible, sterile fibre that sits under the skin.

My experience with this system in cats is positive, but the system has limitations – as would be expected in a monitoring system designed for non-haired, human skin! Sensor application can be tricky, particularly in patients with reduced body condition scores.

In one study of older continuous glucose monitoring systems, placement of the sensor on the lateral chest wall, the dorsal neck or the lateral knee fold positions were compared (Hafner, Lutz, Reusch, & Zini, 2012). Needless to say, the lateral knee fold application was not successful. This preliminary study suggested that dorsal neck placement may be superior to lateral chest wall, however only a small number of cases were in each group.

I find it easiest to clip a square of fur and apply the sensor to the left or right lateral chest with a small amount of superglue or tissue glue applied at four quadrants on the sensor. The sensor should be placed away from insulin injection sites. Point colouration breeds (e.g. Siamese) may develop a change in coat colour at the site of superglue application.

Once the sensor is in place, no dressings are applied as these seem to contribute to migration of the sensor, shorter reading times and also attract the cat's attention to the sensor. Cats do not appear to be bothered by the sensor and Elizabethan collars are rarely necessary.

The Freestyle Libre sensor does not require additional blood glucose measurements for calibration and the sensor is suitable for 14 days of use. Average sensor time is approximately 5-10 days. Once a sensor has been scanned by a specific reader, it can only be read by that reader. Large amounts of data can be obtained and are a useful guide for assessing the status of diabetic



Figure 2. Location of the sensor on the left thorax wall. No dressings are applied over the sensor

patients. It is important to note that aiming for tight glycaemic control based on sensor readings can become problematic and I advise owners not to make dosage adjustments based on readings without discussion with a veterinarian first.

Anecdotally, although interstitial glucose readings appear to calibrate well with blood glucose readings in most cats, there are some cats where discrepancies certainly occur. It is important that additional monitoring tools such as body weight, condition score, appetite and water intake are still used to provide a thorough assessment of the patient before ANY dosage alterations are made.

CGMs are also useful for following trends in non-diabetic patients such as septicemic patients where hypoglycemia is a significant risk and in known diabetic patients undergoing anaesthesia (e.g. dental procedures). There is likely a delay in equilibration between blood glucose and interstitial glucose which is reported to be 9-20 minutes with other systems (e.g. Guardian Real Time). For patients undergoing anaesthesia it is useful to place the sensor 24-48 hours prior to anaesthesia to facilitate readings during the procedure.

In Australia, readers and sensors can be purchased online directly from the wholesaler: <https://www.freestylelibre.com>

The cost of a sensor is approximately \$AUS 95 and a reader is also \$AUS 95. Smart phones can also be used as readers.

At our hospital, we stock a number of sensors and readers but advise clients to purchase their own sensors and readers online for longer-term use. We apply the sensors for the owners and interpret the data for a fee. Removal of the sensor is generally not an issue. The cats can be left to remove the sensor themselves, or it can be removed briskly following application of some nail polish remover. Alternatively, if a large amount of glue has been applied, then give the coat time to grow until clippers can be introduced under the sensor to aid in glue removal.

I find sensors invaluable in monitoring brittle diabetic patients and diabetic patients that have a high likelihood of entering remission (e.g. those with concurrent disease such as pancreatitis or who have received diabetogenic drugs such as dexamethasone), however data obtained must be interpreted together with traditional monitoring tools such as body weight, condition score, thirst and appetite.

Figure 3. Sensors are typically well tolerated by most cats



Weekly Summary
22 March 2019 - 18 April 2019 (28 days)

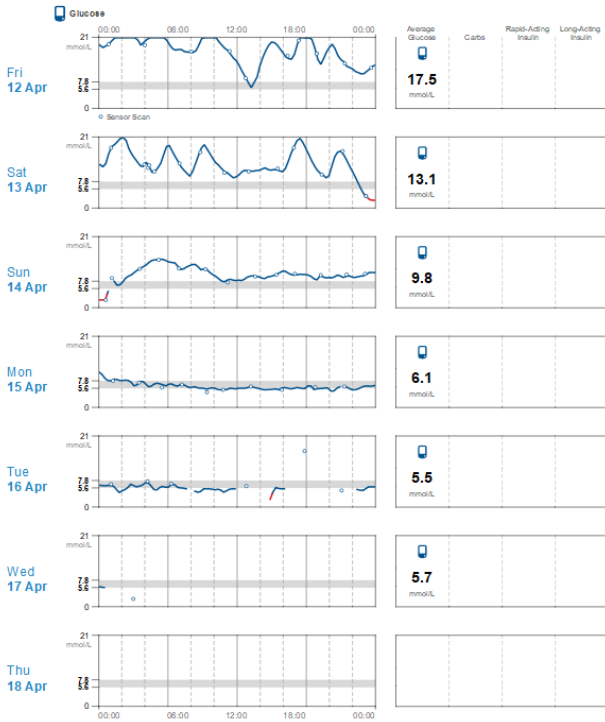


Figure 4. Example of data obtained from a freestyle Libre sensor. The patient received insulin on Thursday evening prior to sensor application. The data demonstrates an initial overswing of interstitial glucose followed by an eventual period of euglycemia and the patient has entered diabetic remission. Note that readings become erratic by Tuesday afternoon and the sensor had stopped working on Wednesday and Thursday.

Weekly Summary
21 June 2019 - 18 July 2019 (28 days)

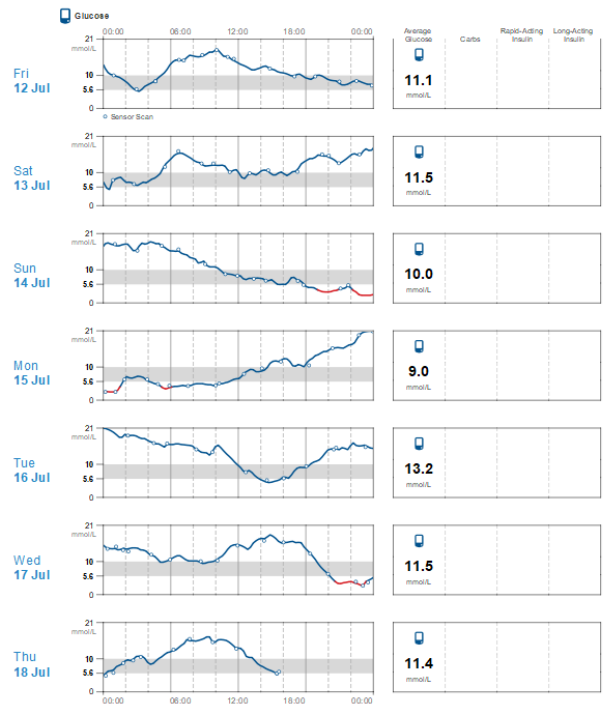


Figure 5. Sensor readings from a newly diagnosed diabetic cat receiving 12 hourly glargine injections at 0700 and 1900. This patient had received an injection of dexamethasone prior to being identified as diabetic and subsequently went into remission. The data identifies periods of hypoglycemia which were asymptomatic and not uncommon with glargine.

Authors' views are not necessarily those of the CVE

eBook download
The impossible diabetic