

Diabetes Mellitus in Feline Patients: How Sweet It Isn't (or is it...)

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Atlantic Provinces Veterinary Conference

April 19-21, 2024

According to ALIVE criteria, diabetes mellitus (DM) is a heterogeneous group of diseases characterized by hyperglycemia due to inadequate insulin secretion, action or both. DM is then subdivided based on an absolute lack of insulin (Type 1 or juvenile diabetes) or a relative lack of insulin (Type 2 or insulin resistant DM). Although there is no real test in feline medicine to know if a patient is a Type 1 or Type 2 diabetic, it is estimated that 95% of newly-diagnosed diabetic cats are Type 2.

Clinically, feline caregivers are aware when their cat has developed diabetes even if they are unable to verbalize the disease that matches their concerns. A diabetic cat will manifest hyperglycemia by multiple clinical signs including:

- Polydipsia (“My cat sure is drinking a lot of water”)
- Polyuria (“I sure have to clean out that litterbox of urine more than ever before”)
- Alterations in appetite (“My cat is picky” or “My cat is always hungry”)
- Sarcopenia (“My cat feels skinny/now I can feel their spine”)
- Poor coat quality (“Why is my cat starting to get matts?”)
- Diabetic neuropathy (“Why is my cat limping”)
- The ADR patient (“Something is wrong with my cat, I know it!”)

It is important to appreciate a client’s observations as these clinical signs will reverse with appropriate treatment. We can use this reversal/improvement of clinical signs as a means of monitoring treatment success (what the speaker calls “hands off monitoring”). Conversely, a decline in patient status can alert us that our treatment plan is not appropriate and we can take action before it comes an emergency (i.e. catching a cat in ketosis rather than full diabetic ketoacidosis/DKA).

With appropriate control of blood sugars (to reverse beta cell damage) and resolution of the underlying disease that contributed to the diabetes in the first place (e.g. resolving obesity) it is possible for a Type 2 diabetic to go into remission or a non-insulin dependent state. With poor glucose regulation, chronic hyperglycemia can cause irreversible damage to the beta cells and the feline patient transitions from a Type 2 to a Type 1. Type 1 diabetics have undergone beta cell destruction and will always be in an insulin dependent DM state. DM type is very important when it comes to treatment as many treatments used in Type 2 DM (such as oral hypoglycemics) would be contraindicated in a Type 1 individual.

Once we have a DM diagnosis, what are our pharmaceutical options for treatment? In the early 2000’s, the human Type 2 DM sulfonylureas drug class (e.g. Glyburide, Glipizide) were used in the cat with very limited success. This led to feline practitioners shying away from oral hypoglycemics and using insulin as the pharmaceutical of choice to regulate a diabetic feline. Insulin choices for use in cats have changed over the decades. Currently, there are two licensed veterinary insulins for cats: Prozinc® (Boehringer-Ingelheim) and Caninsulin/Vetsulin® (Merck). The human-licensed insulin Glargine (Lantus®, Sanofi) has also been used with considerable success. No study has shown one insulin to be better at achieving remission than another. Thus, selecting a starting insulin will largely come down to practitioner preference, product availability, and patient response. Cats can have concurrent endocrinopathies including hyperadrenocorticism and hypersomatotropism (acromegaly) that can greatly impact an individual’s response to insulin.

In 2024, Boehringer-Ingelheim launched the first SGLT2 inhibitor for use in Canada in cats with Type 2 DM under the product name Senvelgo® (Vexagliflozin). The launch of SGLT2 inhibitors makes 2024 an exciting time to manage DM in cats as it gives us an effective oral option to achieve euglycemia in our feline patients.

SGLT2 or Sodium-Glucose Transporter 2 are transporters found in the proximal tubule of the kidney. Their role, along with SGLT1, is to actively move glucose from filtrate (a low glucose solution) to blood (a high glucose solution). In a diabetic, the blocking of SGLT2 allows for the “dumping” of excess glucose via the urinary system and euglycemia to be achieved. As SGLT2 works independent from insulin, and the body still needs insulin to survive/not go into DKA, SGLT2 inhibitors are contraindicated in a patient with absolute insulin deficiency (i.e Type 1 DM). As we are unable to know the exact insulin production of a cat, there is a risk of a patient becoming DKA on these medicines, so they must be closely monitored for ketone production. Cats that went DKA on SGLT2 inhibitors were likely to do so within the first 14 days of starting these medications; making this the time-period where more aggressive monitoring is required. Cats that had previously been on insulin and then were switched to a SGLT2 inhibitors had an approximately 3x greater chance of becoming DKA. This increased risk is likely due to these cats having more beta cell damage (and thus lower insulin production) than a newly diagnosed DM cat. As SGLT2 inhibitors are going to achieve euglycemia regardless of ketone production, these patients may manifest with a normal blood glucose despite being in DKA (i.e. euglycemic DKA). Cats that are acting unwell on SGLT2 inhibitors, or are trending into DKA based on blood ketones, should stop this drug immediately and be transitioned onto insulin.

Ketones in cats can be monitored via blood or urine. Handheld ketone monitors, similar in appearance and use to a glucometer, are readily available. If monitoring via blood, it is important to note that newly diagnosed diabetic cats can have mild elevations in blood ketones consistent with being in ketosis. Blood ketone levels >2.4mmol/L yields a DKA diagnosis sensitivity and specificity of 100% and 87% respectively.

SGLT2 vs Insulin: where to start? As with any treatment plan, patient selection is going to be the key to success. If we ever have concerns about how a patient is doing, it is always essential to look at how the cat is first and glucose numbers/curves second. The most basic questions we should be asking caregivers and ourselves at every visit and for every cat are:

- Are we hydrated?
- Are we eating?
- Are we holding weight/muscle mass?
- Are we a “happy” diabetic?

References/resources:

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