

Diabetes Mellitus (DM)

Diabetes mellitus is a condition where the blood sugar is above normal by a significant amount that the body makes attempts to control the symptoms. DM is generally due to the pancreas not making enough insulin but may also involve the body not being able to use the insulin that is produced. The cells, though supplied with ample “fuel” (glucose), can’t use the fuel and become starved. It is estimated that 1 in 300 dogs and 1 in 230 cats will develop Diabetes in their lifetime.

Typical **symptoms** of diabetes are excessive drinking and urination (PU/PD), weight loss despite good to great appetite, sudden vision loss due to cataracts, unkempt hair coat, flat-footed (plantigrade) stance [especially cats], and “sticky” urine. Uncommon, but even more concerning, symptoms include vomiting, loss of appetite, change in mental status, and coma.

Dogs are almost always insulin-dependent, requiring injections of insulin to control the blood sugar. Cats may be insulin-dependent or dietary-controlled (similar to humans); insulin administration often increases the chances of diabetic remission in cats. In both species, there are certain conditions that can make the body insulin-resistant, so that the body can’t seem to use any of the insulin secreted by the pancreas. These conditions include pancreatitis, steroid usage or overproduction, pregnancy or in-heat, hypothyroidism (dogs usually), and urinary tract infections.

Note: UTIs may be “quiet” since the urine glucose feeds the bacteria and the excessive drinking dilutes the urine to the point that you can’t detect bacteria in a typical sample. The immune system usually does not produce a significant inflammation or response to diabetic UTIs. Sterile urine cultures or RapidBac Vet ELISA on a sterile sample are best to diagnose and rule out UTIs in any diabetic patient!

Diagnosis is made by a thorough history, trend of weight, and evaluation of urine and blood samples. Normal blood glucose levels can go up to 250mg/dL in a stressed or excited animal, so there are times that a fructosamine can help evaluate longer trends, similar to the A1C in humans. Weight loss, changes in drinking and urination habits, and a BG > 300mg/dL + urine glucose are almost definitive for diagnosis of DM in dogs and cats both.

Diabetic ketoacidosis (DKA) can be a life-threatening and extremely expensive and difficult form of diabetes to treat. Ketones are made by the body in an attempt to get rid of extra sugar, similar to fermentation into alcohol. The ketones are toxic, causing nausea and vomiting, severe dehydration, and changes in mentation. Treatment of “sick” DKA is aggressive fluid therapy, short-acting but frequent insulin administration (Regular insulin), and supportive care. The goal is to get the blood sugar under 150mg/dL as quickly as possible to “turn off” ketone production. “Healthy” DKA patients may be able to be treated at home with a more aggressive insulin routine.

Treatment:

- Insulin - generally given by injections under the skin TWICE daily. There are specific insulins for animals (U-40) and people (U-100), so the correct syringe for the correct type of insulin is critical, as you may overdose your pet using the wrong syringe.
- Diet changes - Dogs don’t generally require diet changes, as consistency of diet is more important. Cats should be converted to an Atkins diet of canned food: higher protein,

lower carbohydrate - examples: Special Kitty (Wal-Mart), Fancy Feast pate, prescription diets like Purina DM.

- Weight monitoring, blood and urine monitoring - see below

Monitoring:

- Weight - monitored using the same scale, if possible, to rule out inconsistencies between scales.
- Urine glucose and ketones - indirect measurement but can be done at home. If blood glucose is generally below 250mg/dL (renal threshold), then urine glucose and ketones should be negative most of the time.
- Blood monitoring -
 - Glucose curve - the ideal way to test the “rollercoaster” of blood glucose by checking the sugar before insulin and every 2-3 hours. Rules out Somogyi effect - excessive blood sugar drop with exorbitant overshoot. Requires all-day hospitalization, susceptible to stress interference. New technique described using the Freestyle Libre for general trends (interstitial vs. blood glucose)
 - “Spot check” - checking the blood sugar at the expected nadir (6 hours after insulin). Less stress interference but also least informative. Generally in addition to weight check, questions about PU/PD.
 - Fructosamine - least specific, as it measures the general trend of the blood sugar over the previous 2-3 weeks. Least susceptible to stress interference. Generally considered a good option for cats.

When to be concerned:

- Consistent changes in drinking and urination
- Weakness, especially soon after giving insulin (hypoglycemic event)
- Continued weight loss
- Loss of appetite: 1 missed meal, make note; 2 missed meals, call the vet
 - If not eating, give ½ dose of insulin. Blood sugar is usually better to be a little high than too low (exception: DKA)
- Injection site reactions: abscesses, thickening of the skin by scar formation.

Conclusion: Diabetes can be an expensive and frustrating disease to treat, since it requires possible life-long insulin (time and financial commitments). Since every animal is different, there is no guarantee that the starting dose of insulin will be the final dose, and that dose may change as time goes on. Although diabetes cannot be cured, with attentive owners and support by your veterinary team, it can be managed successfully for years.