

Diabetes in the PBGV

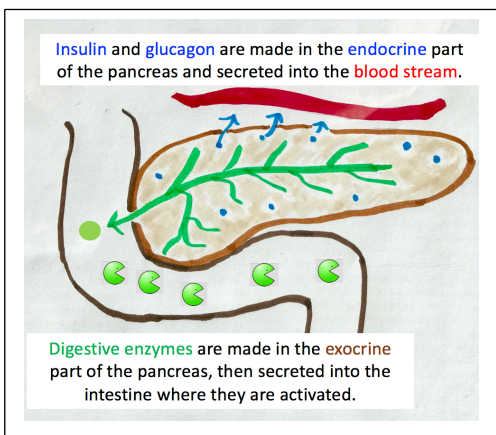
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Diabetes mellitus: (noun) a disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood and urine.

Diabetes mellitus (hereafter called diabetes) is a treatable condition in dogs, as it is in humans; however, it requires a committed effort by the owner. When a dog is first diagnosed, the path ahead seems steep and rocky, but after a period of adjustment both dog and owner usually settle into a new routine.

Diabetes is a disease of the pancreas. In a 2017 Saber Tail article on pancreatitis, I explained that the pancreas is an abdominal gland that helps us convert the food that we eat into fuel for our body. It is divided into two parts. The more well-known part of the pancreas is the endocrine part, which secretes insulin and glucagon into the blood to control blood sugar levels. When the endocrine part of the pancreas fails, the individual will develop diabetes. This endocrine portion is only a tiny fraction of the pancreas; ninety-eight percent of the pancreatic mass is the exocrine portion.

PBGVs are not predisposed to diabetes, but the PBGVCA Health Committee would occasionally hear about an affected PBGV. I became attuned to this problem when my Zoe was diagnosed. I sent out a call for other owners of diabetic PBGVs to tell me about their dogs.



The exocrine part secretes enzymes into the digestive tract to break down the protein, lipid, carbohydrate, and nucleic acid in our food. These enzymes are powerful chewers and they cannot distinguish between the pancreatic tissue that they shouldn't chew up and the food stuff in the digestive track that they should chew. So, the enzymes are made and secreted in an inactive form and only activated when they reach the gut. If the digestive enzymes are activated prematurely in the pancreas, the resultant inflammatory storm leads to pancreatitis.

How does the body handle sugar?

After your dog eats, the carbohydrate in the food is digested in the mouth, stomach, and small intestine, releasing glucose. The glucose is absorbed by the stomach and small intestine and then passes into the bloodstream. The rising glucose level is detected by the pancreas, which releases insulin in response. The insulin tells the body's cells to absorb the glucose so that it can be used for energy.

What are the signs of diabetes?

When there isn't enough insulin released by the pancreas, the cells of the body are starved for energy. They break down fat and protein for energy, causing weight loss along with hunger. Meanwhile, the glucose circulates uselessly in the blood. To eliminate glucose from the blood, the kidney filters it into the urine. Water is pulled along with the glucose. Increased urination (polyuria) leads to increased thirst (polydipsia).

Classic Signs of Diabetes

- Excessive thirst – polydipsia
- Increased urination – polyuria
- Increased appetite – polyphagia
- Weight loss

Bella (10 years old) became very thirsty and would wake up during the night and get water. Also, she seemed to be hungrier than usual. Armstrong (12 years of age) became lethargic and had increased urination. He had a higher than normal blood glucose level on previous routine wellness blood work so they were monitoring him closely for diabetes. Trapper was 12 when he experienced a sudden weight loss and was brought to the vet.

The diagnosis of diabetes was a surprise for Mardi's family. He has always been a big drinker of water, so they didn't see anything unusual. He wasn't urinating more than usual. They didn't see anything that would make them believe he had issues until he started panting a lot. A trip to the vet showed that his blood glucose was over 400 mg/dL. Normal would be 75 to 120 mg/dL.

Rocket's family said PBGV owners should always be suspicious of the early symptoms of diabetes, i.e., polyuria and polydipsia. Although these symptoms can occur with other conditions, diabetes should be at the top of the list. However, with diet, medication and dedication, the disease can be controlled.

Dogs with diabetes are prone to urinary tract infections (UTIs). This is because bacteria in the urinary tract are thrilled by the sugary environment of high glucose urine. The bacteria reproduce, leading to infection. Zoe has had multiple UTIs, as have Mardi and Chica Bella. Other fortunate PBGVs with diabetes have never had a UTI. Lucky Rocket and Trapper.

Hannah (9 years old) started drinking tons and tons of water. At first her family thought it was because the temperatures had risen and she was feeling warm. Then she peed in her kennel. A visit to the vet revealed that, yes she had a UTI, but also diabetes.

What are the risk factors for diabetes?

Canine diabetes has a reported overall prevalence of approximately 1%. It tends to occur in middle-aged or senior dogs. Dogs that have suffered chronic or repeated pancreatitis are at higher risk, likely due to damage to pancreatic tissue. Obesity can increase risk, as can long term use of steroid medications. Health conditions, such as Cushing's disease or autoimmune disorders, are thought to trigger diabetes. And, of course, there is genetics, with some breeds showing higher prevalence (e.g., Samoyed) and others apparently protected (e.g., Boxer).

Zach had pancreatitis prior to his diabetes diagnosis at 8 years of age. Two months prior to Rocket's diagnosis of diabetes, he was diagnosed with inflammatory bowel disease along with a protein losing enteropathy. Rocket had litter mates that were diagnosed with diabetes (Trapper was a littermate). There were also several dogs in Rocket's lineage that were diagnosed with inflammatory bowel disease.

Chica Bella was overweight and on thyroid meds when she was diagnosed at 13 years of age. Ultrasound showed that she had pancreatitis as well. Chica Bella's sister, CC, also developed diabetes and went blind soon after.

Kiki developed Cushing's disease and diabetes simultaneously. She became blind and was then found to have hemangiosarcoma. She was euthanized within three months of her diabetes diagnosis.

How is diabetes diagnosed?

Diabetes in dogs is typically diagnosed between 5 and 12 years of age. An owner might report that her dog has been drinking more water and having to go out more. The vet will probably order bloodwork that will distinguish between diabetes, kidney disease, or an adrenal problem. In a dog showing no clinical symptoms, the first indication might come from routine bloodwork. The vet may also measure the level of fructosamine in the dog's blood. The fructosamine level reflects the average glucose over the past 1 to 2 weeks, similar to the A1C test in diabetic people.

My first hint that Zoe might be at risk for diabetes came from a routine annual check-up when she was 7. Her bloodwork showed that the glucose was a little high. A year later, blood glucose was again a little high and some had spilled over into the urine. Zoe's fructosamine was normal at that time. We switched her to a special diet and things held steady for over a year. Eventually, the blood glucose levels steadily rose and we had to start her on insulin.

Buzz was lethargic, not eating well and getting up during the night to pee. Took him to the vet and they couldn't figure out what was wrong. Over the next few days I noticed he was drinking huge amounts of water. Back to vet for blood work. Glucose was over 700 mg/dL and he was also losing weight.

Daisy was 11 when her vet found high blood glucose levels. We changed her diet and took her in for periodic glucose monitoring sessions at the clinic. After several months she increased water intake and began having accidents in the house. We started giving her insulin injections after meals. If I had to do anything different with Daisy's health - I would be more focused on her weight. The Peebs are so cute and can wrap everyone around their little paws, she would get treats at the batting of those lashes or with a few good howls. Sadly, Daisy recently developed pancreatitis and was euthanized.

How is diabetes treated?

Virtually all diabetic dogs require following a strict feeding schedule, with an insulin injection after each meal. Diabetic dogs also need consistent exercise. Each diabetic dog requires an individual treatment plan and this article will not delve into specifics that should be decided in consultation with your veterinarian.

General recommendations are to feed equal-sized meals twice daily, each meal followed by an insulin injection. If the dog is deemed to be overweight, then a weight management diet will likely be recommended. Dogs with diabetes do well with any complete and balanced food, given at consistent times in consistent amounts. If the dog has signs of pancreatitis, a low fat diet will likely be recommended.

Zoe is on Vetsulin®, which is stored in the refrigerator. I always have an unopened vial or two on hand just in case. The insulin, syringes, and sharps container for used syringes are all obtained through the vet's office. Zoe is a real trouper about her shots. She comes over as soon as she hears me get the insulin vial out of the refrigerator. Of course, she gets a nice morsel of turkey before and after her shot, which may account for her enthusiasm.

Jesse's mom had an excellent suggestion for protecting the insulin vial. Her kitchen has a ceramic tile floor that is unforgiving to a dropped vial. Therefore, Jesse's insulin vial is always encased in a silicone insulin vial protector just in case there is a slip.

Buzz hated the shots and for months he would scream whenever we gave them. We tried to teach our dog walker how to do it, but Buzz would roll over on his back so she couldn't. Eventually he got better, but it took a long time.



It is also important to have an action plan in case of low blood glucose. This may appear as lethargy, abnormal gait, weakness, tremors, or even seizures. I have corn syrup at hand and was told to rub a some onto Zoe's gum tissue if she exhibited signs of hypoglycemia. Ask your vet what s/he recommends.

Monitoring blood glucose levels

Some PBGV owners take their PBGVs to the vet for blood glucose measurements; others monitor blood glucose levels at home. The goal of monitoring is to control clinical signs of diabetes while avoiding hypoglycemia. A periodic blood glucose curve is usually recommended.



At first, I measured Zoe’s blood glucose every month using an AlphaTRAK 2 blood glucose monitor. This required using a lancet to get a small blood sample from her inner upper lip, touching a test strip to the blood drop, inserting the strip into the meter, and reading the glucose value. Of course, Zoe knew when I was gathering up the supplies for a blood glucose curve and she would go on high alert. The best method for me was to wait until Zoe was settled on a sofa or her bed, approach with everything hidden in a pocket, settle in next to her, and put the test strip in the meter to initialize it. Then I would peel back the upper lip, stick it with the lancet, place the test strip in the blood drop and wait for the beep. Sometimes I would have to stick her more than once to get a good blood drop. I hated sticking Zoe and (no surprise) she hated it, too. But she was such a good girl!

Mardi does not like the blood tests. He has several “tricks” he uses to try and “test” my expertise and I don’t always win. We have had our moments where we felt like we were very incompetent in what we were doing. If we had any difficulties, it has always happened on the weekends. We have made many calls to the ER vet asking questions about blood glucose levels and insulin doses. Thankfully they know us and are willing to help us as needed when our vet is not available. After a year and a half, it has become routine, with only few hiccups!

Mardi’s blood glucose levels are well regulated now except when he gets a urinary tract infection. That has been my experience with Zoe as well.

I was having trouble getting Zoe’s blood glucose levels stable and got a referral to a veterinary endocrinologist at Tufts Cummings School of Veterinary Medicine. She recommended switching to a FreeStyle Libre continuous glucose-monitoring system to measure Zoe’s blood glucose. This has been a game changer for me. Every 6 weeks, I purchase a FreeStyle Libre sensor from the pharmacy. A vet tech from my local clinic shaves a small



area of Zoe’s back and applies the sensor. Key is to place it where she can’t scratch it off! The sensor analyzes Zoe’s blood glucose continuously for the next two weeks. Every few hours, I wave a reader over the sensor and the glucose levels during the last interval are transmitted to the reader. I download the reader’s data to my laptop, send the data to Zoe’s endocrinologist, and quickly get feedback on whether Zoe’s insulin dose should be adjusted.

Ann echoes my enthusiasm for the FreeStyle Libre sensor. *The vet recommended the Freestyle Libre glucose sensor for Bella. Once we got the hang of attaching the sensor it seemed easier. We can download her glucose charts and share with the vet. I will say that learning to do all these things during the pandemic with the COVID protocols has been more challenging.*

After switching to the FreeStyle Libre, Daisy’s glucose levels improved. I finally feel a little more in control of her diabetes and I am glad we spent the money to do the two week monitoring session with this product. It gives us a much better understanding of her glucose levels.

Prior to her diabetes diagnosis, Zoe and I loved participating in scent work trials; however, after she became insulin dependent, I entered her in two scent work trials in which she failed to qualify in any of six runs. It was too much for her. Now, thanks to the FreeStyle Libre sensor, I have learned much about Zoe’s limitations. Even a longer walk than usual in the neighborhood sends her blood glucose below the target range. The longer hikes

we used to take are out of the question. On the other hand, when the weather is poor and she balks at going on a walk where she might get her dainty paws wet, her blood glucose rises above the target range due to lack of exercise. It is a balancing act. For Zoe, a regular schedule of food and exercise is paramount.

Blindness

Keeping blood glucose levels tightly controlled is important. Elevated glucose in the blood leads to higher than normal glucose in the vitreous fluid of the eye. There the glucose is metabolized by an enzyme into another sugar, sorbitol, which accumulates in the eye. The sorbitol accumulation pulls water into the eye and causes cataracts.

Mardi very quickly lost his eyesight and was blind within about two weeks. He has no trouble get around the house and yard. If he should happen to bump into something he stops for a second and then tries again in a slightly different place. His nose is still king and leads him wherever he wants to go. We never took Mardi to an ophthalmologist because it wasn't suggested. In hindsight I guess we should have, but my vet was so matter of fact that he would go blind we didn't even consider it.

Kiki became blind a few weeks after diagnosis. Zach's vision was greatly affected to the point where he had cataract surgery (with lens implants) and has an eye drop regimen that we follow in addition to the insulin injections.

Trapper (Rocket's littermate) was blind at the time when his diabetes was diagnosed. They say that dogs get used to being blind. The most heart wrenching part of Trapper's illness was having him refuse to go for walks when his eyesight was totally gone. He bumped into everything. I put up a lot of barriers in the backyard to protect him. He learned to listen to my panicked screams and he would stop until I could run to him and reposition him around the object he was about to walk into. If I could have kept him alive with just diabetes, I would have done whatever it takes for him no matter how much I had to turn my world upside down.

Buzz died 2.5 years after the diagnosis. His vision was not good before he was diagnosed. Don't know how much was because of the diabetes, because I don't know how long he had it before diagnosis. His vision continued to get worse and he was pretty much blind when he died.

The diabetes is most likely the cause of Daisy's cataracts, which has impacted her life and ours as she has issues getting around.

There is a new product, Kinostat®, which inhibits the conversion of glucose into sorbitol and may delay cataract formation in diabetic dogs. However, it is still in final stages of approval and is not yet available to your veterinarian. If you have a diabetic dog who has not yet developed cataracts, ask your vet about Kinostat®, so you are notified as soon as it is available.

A lifelong commitment

Keeping your diabetic PBGV healthy means increased vet bills, added expenses for blood glucose monitoring, and sticking to a rigid schedule of feeding and exercise. This can be a challenge to manage.

Rocket received insulin every 12hrs. This impacted our ability to plan long stays away from home. Had Rocket not developed severe cataracts secondary to his diabetes, the impact of this disease would not have been as significant. The combo of inflammatory bowel disease and diabetes did, however, have a great impact on his quality of life.

The impact of diabetes on Zach's quality of life and our family activities is minimal. (Zach might disagree as he sometimes complains when getting his twice daily shot.) We just have to make sure we're home to feed him and give him his insulin shots at the right times. That's not hard for us because we're retired...if we were a young family, I can imagine it could get a little tricky.

Managing diabetes had a major impact for us. Trapper's shots were to be given every 12 hours. I had a hard time finding affordable insulin. I had to make sure that Trapper was hungry and ate his meal when it was time for his shots. Insulin must be refrigerated and there were a couple of times when I forgot to put it back in the fridge and I had to purchase another bottle quickly.

Bella's walks are shorter, we really have to watch her glucose levels. Also, we don't really feel like we can leave her overnight with anyone because she needs consistent care.

Dealing with diabetes can be challenging, but time and experience makes it a little easier. After you get used to doing the tests and giving the injections it becomes a much more comfortable routine part of the day.

The hardest thing is consistently getting the testing and injections 12 hours apart. If something out of the ordinary keeps us away from home longer than expected and delays Mardi's meal and injection, it may take a few days to get back on track. Nevertheless, I think Mardi's quality of life is still very good. He loves to go on walks, ride in the car and wander the back yard. His favorite thing is to sit on the back porch and bark at the world. Then he will come inside and nap. He loves his naps! He has always been a loving dog and he is still that way. Mardi is 13!

Lessons from the hounds.

When your dog is first diagnosed, it will feel daunting and scary but in reality it's not a death sentence and you eventually get used to dealing with all that needs to be done. Hannah still is a happy girl and she doesn't even notice or care about having the shots. She loves her new treats. She is a champ!

At first, it is very daunting to deal with the blood tests, injections, suddenly realizing you had forgotten you had used the last lancet, test strip, or syringe and your next supply order is not coming until the next day. Then you have the fluctuating levels, and you start to blame yourself for possibly causing damage because you were late with their injection. You start thinking of your PBGV as a set of numbers and worry more about them than as a dog. It takes a while to come to terms with this disease and get to somewhat comfortable terms with what you and your PBGV are dealing with. My best advice is to remember to breathe first and know that your love for your PBGV is still the same and nothing will change that. You are not hurting your dog with the tests and injections you are giving them the best loving, care they need.

It is important to know the signs and communicate with the vet. Catching it early is key.

Yes - it is a challenge to manage. It's not the end of the world but it is a change.

References

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