

Diabetes Mellitus (DM)

Background information

- Diabetes Mellitus (DM) is an endocrine disorder characterized by elevated blood sugar levels (termed hyperglycemia). It is caused by the inability of the pancreas to produce sufficient insulin or the presence of another disease process that prevents the body from being able to control the amount of sugar in the blood.
- Insulin is a hormone needed by the body to transport glucose (sugar) out of the bloodstream and into energy producing cells. Glucose is the fuel for cells of the body and is needed for normal body functioning. Lack of an energy source by cells of the body tells the brain that more energy source is needed and the animal then has an increased appetite. Therefore, a common clinical sign of diabetes is a hearty appetite with weight loss rather than weight gain. Another clinical sign of the diabetes is increased drinking and urinations due to result of excess glucose in the urine.
- Possible causes of the development of diabetes include genetic predisposition, chronic pancreatitis, obesity, hormonal abnormalities, endocrine disease (including Cushing's disease), infections, and certain medications (including corticosteroids).

Clinical signs and Diagnosis

- Common clinical signs include increased thirst and urination, increased appetite with weight loss. Dogs may present for evaluation of cataract formation or sudden blindness due to cataracts. Many diabetic dogs will develop cataracts within one year, but cats rarely develop cataracts.
- Some pets may develop an abnormal gait due to what is called a diabetic neuropathy. This is often characterized in cats by a flat footed gait in the rear limbs which is commonly referred to as a 'plantigrade stance.'
- Some patients become severely weakened, depressed, dehydrated, and may also have severe metabolic abnormalities. These patients are most likely experiencing what is termed diabetic ketoacidosis (DKA). This is a serious condition that requires immediate medical attention for it can be life threatening.
- A thorough medical history and physical examination are important in diagnosing diabetes. Blood work and urinalysis are necessary to confirm the presence of diabetes and to determine the severity of the disease at the time of presentation. In some patients tests are performed to screen for pancreatitis or infections.

Treatment

- Diabetes can generally be well controlled with twice-daily insulin injections, which can be done by pet owners at home. In some cases once daily injections or even oral pills are used to treat diabetes however they are often less successful in reaching control. It may also be recommended to alter the diet and exercise habits of these patients.
- Treatment is life-long in dogs; however some cat's glucose levels become normal again without insulin therapy. This is call "transient diabetes". It is important to recognize that these cats may become insulin dependent again later in life.
- There are many types of insulin available allowing doctors to tailor the dosage and schedule to meet the needs of the patient. Some insulin are designed for dogs and cats while other insulins are designed for humans but used safely in dogs and cats. If a certain type of insulin is not working well for the patient, another type of insulin may be used.

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- At home, it is important to be consistent with a feeding schedule and the timing of the insulin injection in relation to the meal. It is best to give insulin after your pet has eaten. If your pet does not eat a full meal, or if they vomit, it is important to adjust the insulin by giving half of the usually amount. If your pet does not eat well for 2 meals it is important to contact your veterinarian.
- You will be shown how to draw up the insulin and give the injections. The needles used are very small and your pet will probably not even feel the injections.
- Control of your pet's diabetes requires monitoring of blood glucose levels. This monitoring will help aid your veterinarian in determining the proper type and amount of insulin needed to control the diabetes. Determining the amount of insulin required for your pet may require a bit of time and may also entail eliminating other concurrent disease processes.
- Not giving enough insulin can cause the blood glucose level to remain high, but giving too much may cause the blood glucose to drop too low resulting in weakness, or even seizures. This can happen if your pet does not eat well and receives a full dose of insulin.
- If your pet is profoundly weak or seizures at home, you can place sugar in the form of Karo syrup, honey, etc on the gums and then transport them to a veterinarian immediately.
- Diet is important in the management of diabetes (more so in cats than dogs), and there are a variety of prescription diets that may be recommended for your pet. However, it is most important that your pet eat meals consistently and on a regular basis. Weight loss is an important factor in the management of the obese

diabetic patient and can result in a decrease in the insulin dose needed to control high blood sugar levels.

Handling of Insulin:

- Insulin should be stored in the refrigerator. The bottle should be gently rolled between the hands to mix before drawing it up into the insulin syringe. It is very important to never shake or freeze insulin because this will cause the product to not work properly.
- Insulin is dosed in "units (U)". There are 2 main types of insulin syringes (U-40 and U-100). U-40 syringes are used with veterinary insulins and U-100 syringes are used with human insulins. It is important to use the appropriate type of syringe, depending on the type of insulin. You will be told what type of syringe is needed based on the type of insulin that is prescribed.
- After the injection has been given, do not attempt to recap the needle, as you could accidentally stick yourself in the finger or hand. Please place the uncapped needle in an empty plastic milk or soda container. You can bring this container to the veterinarian's office at the time of recheck so that the needles can be properly disposed.

Blood Glucose Monitoring:

- The most important way your veterinarian can monitor your diabetes is by examining your pet and discussing with you how your pet is doing at home.
- There are two lab tests to monitor the control of your pet's diabetes; a blood glucose curve or a fructosamine level (or a combination of the two).
- A blood glucose curve requires that your pet stay in the hospital for the day and their blood sugar is generally checked every 2-4 hours (depending

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on the type of insulin). It is important that your pet eat a normal meal that morning and that they get the usual insulin dose. If the pet has not eaten, it is important to speak to your veterinarian and reschedule this appointment.

- Fructosamine is a protein that binds to glucose in the bloodstream and circulates an average of 2-3 weeks. This is a good indicator of the average blood sugar levels over a period of time. The higher the sugar levels, the higher the fructosamine level. An elevated fructosamine level may indicate poor control of glucose and will require an adjustment to the dose, frequency, or type of insulin being administered. A low fructosamine level may indicate that too much insulin is being given and the glucose levels are too low over a long period of time. This will also require an adjustment to the dose of insulin.
- At-home glucose monitoring with a glucometer is possible in some patients once adequate control has been achieved with regular hospital visits. If this is appropriate for your pet, a veterinarian can prescribe a glucometer and show you how to take blood samples at home.

Things to Watch for at Home

- Seizures or twitching, unresponsiveness, decreased appetite, depression, stumbling when walking, vomiting, cataracts (cloudiness of the lens) in the eyes, increased thirst and urination

Other Considerations

- Diabetic animals are more susceptible to other health problems, even those that are well controlled. Diabetes can increase the risk of infections (especially urinary tract infections), delay wound healing, increase the risk of pancreatitis and nervous system disorders, and can lead to cataracts.
- The cost of caring for a diabetic pet is important to consider. In most patients, this is a life-long requirement. Cost will vary depending on the size of the pet and type of insulin required to manage the diabetes. Frequent blood work is also needed in a newly diagnosed patient, and continued monitoring is required once control has been established.
- There is a time commitment required to care for diabetic pets. It is important to establish a consistent routine when treating diabetes and you must be able to commit to regular evaluations by your veterinarian. Most owners become quite comfortable giving injections and it can even become a bonding time for you and your pet.