Diabetes Mellitus in Dogs

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Diabetes mellitus is a common illness in dogs. It is caused by either a decreased production of insulin or decreased functioning of the insulin. Insulin is a hormone produced by the pancreas that helps glucose move from the blood stream into the cells of the body where it can be used for energy.

What causes diabetes in dogs?
There appear to be many factors that can contribute to the development of diabetes in dogs. Genetics plays a role. Some diabetes may be immune-mediated. This means the dog's immune system works against the pancreas as it tries to produce insulin.

What dogs are most at risk of developing diabetes?
Dogs of any age can develop diabetes, but most are between 7 and 9 years old. Females appear to be at increased risk. Certain breeds appear to be more at risk, including Samoyeds, Australian terriers, miniature schnauzers, pugs, and miniature and toy poodles. Dogs who have had multiple episodes of pancreatitis also appear to be more likely to develop diabetes mellitus.

What are the signs and symptoms of diabetes in dogs?
Most dogs with diabetes will have increased thirst and urination. Although the appetite is usually good or increased, there is often weight loss. Some dogs, however, may become obese. In some cases, blindness due to cataracts may be the first indication to an owner that there is a problem. Cataracts would appear as cloudy eyes with vision loss.

Several diseases often occur in conjunction with diabetes mellitus, including Cushing's disease (hyperadrenocorticism), urinary tract infections, hypothyroidism, acute pancreatitis and cancer. The presence of these diseases can complicate the diagnosis and effective treatment of diabetes.

Dogs may develop a serious complication of diabetes known as ketoacidosis. In this emergency condition, the blood glucose becomes very high and breakdown products of fat (ketones) accumulate in the blood. This can cause severe lethargy, weakness and vomiting.

How is diabetes in dogs diagnosed?
Diabetes in dogs is diagnosed based on the clinical signs as described above, the finding of glucose in the urine, and laboratory testing of the blood that demonstrates the blood glucose is persistently high. Because there are often complicating diseases present, a complete blood count, chemistry panel, urinalysis and urine culture are generally recommended.

How is diabetes in dogs treated?
Diabetes cannot be cured, but it can be managed. Diabetes in dogs is managed through a combination of regular and controlled exercise, diet, and insulin.

Exercise
The amount of insulin needed by an animal is directly affected by the diet and energy output of the animal. A dog who jogs several miles with his owner each day will have much different insulin needs than a dog who is basically a "couch potato." When regulating a dog on insulin, it is important that the dog receive approximately the same amount of exercise each day.

Diet
Diet is another factor that greatly influences insulin requirements. The dog should receive the same dog food each day and be fed the same amount at the same time each day. Generally the dog is fed twice a day before she receives her insulin. Most diabetic dogs do best on a diet that is high in insoluble fiber, such as Hill's w/d or Purina DCO. You will need to eliminate treats according to your veterinarian's directions.

Insulin
There are several types of insulin used in the treatment of dogs with diabetes mellitus. The characteristics differ as to source, duration of action, concentration, and the frequency of administration. The most common insulin used in dogs is NPH (Humulin-N or Novolin-N).

Usually the first dose of insulin is given while the dog is in the hospital and the blood sugar is measured every 2-4 hours. The subsequent doses may be adjusted depending on the levels of blood sugar and the duration of the effect. It may take a few weeks to two months and multiple laboratory tests to find the most appropriate insulin dose for an individual dog.

Your veterinarian and staff will show you how to properly handle, measure, and give insulin to your dog. We also have an article on insulin administration.

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Home monitoring
Diabetic dogs will need careful monitoring at home. If you are willing and able, your veterinarian may recommend that you monitor your dog's blood sugar level through the use of a glucose monitor. A small lancet is used to puncture the skin and obtain a small amount of blood that is drawn into the machine. A display then shows the glucose concentration in the sample. A second method of monitoring is through checking the urine for glucose and ketones using special dipsticks available for home use. Finally, you should take daily notice of your dog's eating, drinking and urinating habits. If these change after your dog has been regulated on insulin, it may indicate a need to more closely look at the insulin dosage. NEVER change the insulin dose based on any home monitoring unless specifically told to do so by your veterinarian.

Treatment of concurrent diseases
Dogs with concurrent diseases, especially hypothyroidism and Cushing's disease, may be very difficult to regulate on insulin unless these diseases are also treated.

Considerations in the management of diabetes in dogs: Before treatment is started, it is important that the owner be well-informed and have the time necessary to make the correct decision since regulating a diabetic dog requires commitment. Owners should know:

- It will take some time (weeks) and multiple laboratory tests to determine the best insulin dose for your dog.
- For dogs, insulin is almost always given twice a day, every day at specific times, probably for the life of the dog. Always follow your veterinarian's directions as to type, amount, and when to give the insulin.
- Insulin must be handled properly (refrigerated, not shaken, etc).
- There is a proper technique for administering insulin to a dog that must be followed.
- The type of insulin and insulin syringe that are used should not be changed unless under guidance by the veterinarian.
- The type and amount of food and when it is fed must be consistent.
- The type and amount of exercise must be consistent.
- The dog will need to be carefully monitored at home on a daily basis; when to seek veterinary advice and return for rechecks will depend on what signs the dog may be showing.
- Insulin requirements often change over time and the dose of insulin may need periodic adjustments based upon laboratory testing.
- Emergency conditions of low blood sugar (hypoglycemia) can be seen if too much insulin is given in relation to food intake. The owner must be aware of when this could occur, the signs of the condition, and how to manage it.
- A blood sugar level that is too high is better than one that is too low.
- Diseases or procedures the dog may have in the future (e.g., surgery, teeth cleaning) may need to be managed differently because of diabetes.

Hypoglycemia

You should carefully monitor your dog for signs of hypoglycemia. This is a condition in which the blood glucose level becomes too low. This most commonly occurs when the insulin dose is too high in relation to the food intake, or in cases of increased exercise. This can be a serious and even fatal condition, so you need to understand what signs to look for and what to do if you see them.

Hyperglycemia (high blood sugar) is always better than hypoglycemia (low blood sugar.

Causes of hypoglycemia: Most of the causes of hypoglycemia in diabetic dogs can be prevented or predicted. Hypoglycemia can result from:

- Administration of too much insulin. This can occur if the wrong insulin or wrong type of syringe is used, or a second dose of insulin is given due to miscommunication between family members or to try to make up for a first dose that was improperly given. Rarely, a dog may undergo spontaneous remission of their diabetes, i.e., he suddenly produced enough insulin on his own and does not need supplemental insulin. How or why this occurs is not well-understood, and it may be only a temporary phenomenon.
- Change in food intake. If insulin was administered but the dog did not eat her entire meal, the excess insulin in relation to the amount of glucose available to the body will cause the blood glucose to go too low. Similarly, if the meal is not given on time, or a different food was fed, hypoglycemia could occur.
- Increased exercise or calorie consumption. If the body is using more glucose for energy, it may pull too much glucose out of the bloodstream.
- Poor regulation. If the dog is poorly regulated or insulin changes are made too rapidly in the regulation process, low blood glucose can occur.
- Metabolism changes caused by other diseases. Infections, some medications, heat cycles and other hormonal diseases (or their treatment) can result in a change of the body's insulin requirements.

Signs of hypoglycemia: Dogs with hypoglycemia will act depressed and lethargic; may show weakness, muscle twitching, or incoordination; progress into a stupor or coma; and ultimately develop seizures and die. The earlier the signs are recognized, the easier and more successful the treatment.

Treatment of hypoglycemia: Home management of hypoglycemia depends upon recognizing the signs of hypoglycemia early. If the dog is able to eat, offer her her normal food. If she refuses to eat but can still swallow, have her

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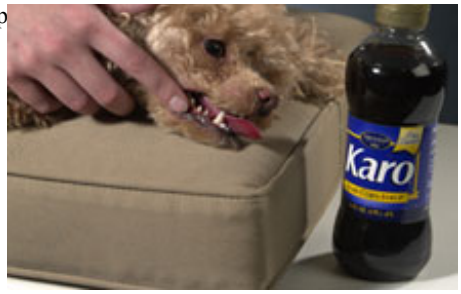
lick some Karo® (corn) syrup. If she is unable to swallow, apply the corn syrup to her gums. Once she has responded, feed her a meal. Contact your veterinarian who can determine what other treatment or hospitalization may be necessary.



Further complications of diabetes in dogs
In addition to hypoglycemia, there are other diseases that become more common in dogs with diabetes.

Urinary tract infections: Because the urine is dilute and often contains sugar, bacterial infections of the urinary tract are more common in diabetic dogs. If you notice your dog has increased urination, is straining to urinate, is urinating only small amounts, or has discolored urine, contact your veterinarian.

Other infections: It appears that the immune systems of diabetic dogs may not function as well as those of a normal dog. As a result, they may be more susceptible to other infections.

Cataracts: Cataracts ultimately develop in up to 80% of dogs diagnosed with diabetes mellitus. These can be effectively treated through surgical removal.

Others: Although rare, dogs with diabetes may also develop increased blood pressure, uveitis (inflammation of the eye), kidney disease, and atherosclerosis (hardening of the arteries).

Summary
Dogs with diabetes are generally middle-aged females, and show signs of increased thirst, urination and appetite. Diagnosis is based on clinical signs and laboratory testing of blood and urine for glucose levels. Treatment consists of insulin and a consistent diet and exercise regimen. Hypoglycemia (low blood sugar) is a dangerous complication when treating diabetes and owners should know the signs and home treatment. Other diseases, especially hypothyroidism and Cushing's disease may complicate the treatment of diabetes. Urinary tract infections and cataracts are more common in diabetic dogs.

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