

Feline Diabetes Mellitus

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Overview

Diabetes is a fairly common disease in obese cats that results when a cat is not able to produce adequate insulin and/or becomes resistant to the effects of insulin.

Diabetes causes increased blood glucose (sugar), urine glucose, increased urine output and weight loss. If untreated, it will cause progressive weight loss and eventual death. It can lead to ketoacidosis; a severe, acute, life-threatening condition related to the buildup of ketones in the blood.

Treatment of uncomplicated diabetes usually involves feeding a high protein diet and giving insulin. A minority of cats will respond to diet alone.

Initial and Follow-up Testing

There are a number of tests that are indicated for cats suspected of having diabetes. These include:

- A **full blood panel**. This panel includes a measurement of blood glucose. It also helps determine if there are other diseases that may affect the health of the patient. The results of these tests help determine initial treatment as well as long term prognosis.
- A **urinalysis** – will help determine:
 - Levels of glucose in the urine
 - If ketones are building up in the blood – if there are ketones, this is an indication of ketoacidosis and affects prognosis and treatment
 - If there is an infection.
- **Fructosamine** – gives an indication of what the blood glucose has been over the past two to three weeks. It is used to confirm the presence of diabetes and to monitor the adequacy of treatment.
- A **urine culture**. When there is glucose in the urine, it is easier for bacteria to grow and an infection is more likely to develop. If there is infection, it will affect overall health and quality of life. Infection will also make treating the diabetes more difficult. A culture is the best way to determine if there is a urinary tract infection.

These tests are usually repeated every six months in diabetic cats.

Treatment

The goal of treatment is to maintain normal blood glucose levels. Some cats can be cured of their diabetes if they are treated aggressively and effectively. When cats are cured of diabetes, they no longer require insulin

- Diet. Cats are carnivores and protein is their natural diet. With a high protein diet, much less insulin is usually needed.
- Insulin administration. Insulin helps move glucose from the blood into the cells so that the cells can utilize it for energy. It is usually necessary to give diabetic cats insulin twice daily.
- Monitoring blood glucose. The goal of treatment is to lower the blood glucose into a normal range for an extended period of time. To do this effectively, it is important to know what the blood glucose levels are. And the best way to know this is to measure blood glucose levels at home. If the blood glucose levels get too high for a short period of time, it's usually not critical. But if the blood glucose gets too low, it is life threatening. Monitoring is very important.
- Resolving obesity. Obesity leads to insulin resistance. For the best possible diabetic control, it is necessary to get the patient to a normal weight.
- Treating infection. Infection anywhere in the body can lead to insulin resistance and poor response to treatment. The two common locations of infection that we find are infection in the mouth from dental disease and infection in the urine due to the diabetes itself.

The goal of treatment is to lower the blood glucose. But if the blood glucose gets too low, it is life-threatening.

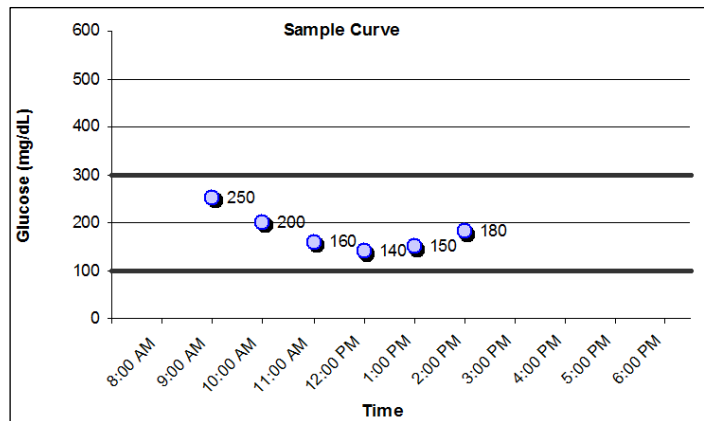
Glucose Curves

Glucose curves are created by measuring the blood glucose every one or two hours and plotting the results on a graph.

A curve tells us peak glucose concentration and trough (the lowest) glucose concentration. It also gives an indication of the duration of action of the insulin.

When gathering the data for a curve, the blood glucose is measured and recorded every one or two hours. Measurements are made until two points are each higher than the previous point.

In the curve to the right, the low point was 140 at 12:00 noon. Measurements were taken again at 1:00 pm and 2:00 pm. 150 is higher than 140 and 180 is higher than 150 so the curve is complete.



When we talk about “doing a glucose curve”, we don’t usually have you plot out the curve. We usually just have you collect the data (time and glucose levels). We can evaluate the data without plotting the graph.

Hypoglycemia

Hypoglycemia literally means “low blood sugar” and can result when a cat is given more insulin than they need. The most common signs are an unwillingness to eat, confusion and “head bobbing”. But any abnormal behavior may be a sign of hypoglycemia. It is a life-threatening condition that should be treated as soon as possible. Treatment at home consists of giving sugar. This is usually in the form of syrup (e.g., Karo syrup) but can be any form of sugar that you can administer quickly. Granular sugar mixed with water works fine. Before starting insulin therapy, you should make sure that you have a source of sugar and a plan for administering it if needed.

You should give this sugar if:

- Your cat is given too much insulin (e.g., you accidentally give two doses of insulin).
- If their blood glucose goes below 80.
- If you suspect that the blood glucose is too low and you are unable to obtain a reading on the monitor.

Hypoglycemia is a life-threatening condition that should be treated as soon as possible.

Don't give sugar if your cat is not responsive. If they are non-responsive, rush them to the nearest available veterinarian. (But call first to make sure that someone is there.)

The Plan

These are the initial steps that we usually recommend in treating a diabetic cat. They should be done in this order:

1. Start the patient on a high protein, canned food.
2. Check the Internet and learn as much as you can about feline diabetes. Some of the information is wrong or dated but overall it's worth reading.
3. Schedule an appointment for us to show you how to measure blood glucose at home and how to give insulin. (But don't give any, just yet.)
4. Obtain supplies: insulin and syringes, monitoring equipment, and a source of sugar.
5. Start measuring the blood glucose at home in order to become comfortable doing so.
6. On a day that you will be home, measure the blood glucose. If the blood glucose is above 180, give ½ unit Glargine insulin and perform a glucose curve.
7. If at any point the blood glucose is less than 80, give sugar and call us.
8. When you are done, call us with the results of the curve.
9. Don't give any more insulin until we discuss the results of the curve.

Important Points

To prevent hypoglycemia, keep in mind:

- Insulin lowers blood glucose.
- Exercise lowers blood glucose.
- Food increases blood glucose. Lack of food decreases blood glucose.
- Obesity increases blood glucose. As a cat gains weight, they will need more insulin. As a cat loses weight, they will need less insulin.

General guidelines for treating a diabetic cat on a day-to-day basis:

- If food and activity level are the same today as yesterday, the dose of insulin today will probably also be the same.
- If your cat is eating less than normal, the correct dose of insulin will be lower.
- If your cat's blood glucose is lower than usual, the correct dose of insulin will be lower.
- If your cat is sick, the correct dose of insulin will be lower.
- If your cat is more active than usual, the correct dose of insulin will be lower.
- If you are unsure about what dose of insulin to give, don't give any until you talk to us.
- If you are unsure whether to give any insulin or not, don't give any.
- If you are unsure whether the full dose of insulin was given, don't give any additional insulin.
- If the blood glucose is already in the normal range and it's time to give the insulin, don't give any insulin.
- If your cat is acting strange or sick, measure the blood glucose.
- If your cat's blood glucose is less than 80, give sugar.
- If in doubt about whether the blood glucose is too low, give sugar.
- If you are unsure what to do, call us before giving any insulin.

If your cat becomes sick or does not eat normally, it is usually best to *not* give insulin until discussing it with us.

Miscellaneous risks:

- If you have someone else give the insulin for you, make sure they know the correct dose. We have known pet sitters to mistakenly give 20 units instead of 2 units. This causes the blood glucose to drop rapidly and the patient can die.
- If you are unsure whether the insulin was already given, don't give any. We have had cases where one spouse gave insulin... and so did the other spouse. Again, this is very dangerous.