

## What is Diabetes Mellitus?

Diabetes mellitus occurs when the pancreas does not produce enough insulin to properly regulate blood glucose levels. The cells of the body rely on glucose (a sugar) for energy. Glucose is carried within the blood and delivered to cells. However without insulin the glucose cannot be passed from the blood stream into the cells, which means the glucose level in the blood is high but the body's cells are effectively starving.

If cells cannot obtain their energy from glucose, they use another type of energy source called ketones, which are produced from the breakdown of fat. Large amounts of ketones can be found in the urine of animals with uncontrolled or untreated diabetes mellitus. High amounts of ketones in an animals blood can make them quite unwell, common symptoms being depression, vomiting and severe dehydration. This is called Diabetic Ketoacidosis and requires urgent and intensive treatment in hospital.

Under normal situations kidneys are able to prevent the loss of glucose into the urine. However in diabetic animals, there is so much glucose in the blood that the kidney is overwhelmed and glucose is passed into the urine. As the glucose is lost into the urine it also pulls extra water with it. This leads to increased thirst and increased urination which are symptoms often noticed by owners prior to the diagnosis of Diabetes.

## What are the signs of Diabetes Mellitus?

1. *Eating more/ravenous appetite:* The low glucose level in the cells (despite high levels in the blood) makes the body think it is hungry. As the animal cannot get the energy usually supplied by the glucose carried in the blood it tries to compensate for this by eating a lot more food.
2. *Drinking excessively:* The high glucose levels in the bloodstream interfere with the kidneys ability to conserve water in the body. This will cause excessive urination. Because they are urinating too much they will need to compensate by drinking much more water.
3. *Weight loss:* Despite the fact that diabetics often eat more, they often start to lose weight as most of the energy from the food cannot be properly absorbed or stored by the cells in the body.
4. *Urinary Tract infections:* All the sugar in the urine makes the bladder an excellent place for bacteria to grow.
5. *Cataracts:* In dogs, high amounts of sugars can enter the eye causing rapid cataract formation. The lens of the cats is different and so this problem really only occurs in dogs
6. *Diabetic Keto-acidosis (DKA):* a severe illness where the animal stops eating, seems reluctant to move, may start vomiting and seem subdued/depressed. This can occur if diabetes mellitus is left untreated or the animal develops another disease or problem (such as running out of water on a hot day, developing a urinary tract infection or even just having an episode of gastro-enteritis). If left untreated DKA can lead to coma and death.

## Diagnosis of Diabetes

This is usually made by measuring high levels of blood glucose and a large amount of glucose in the urine. Ketones may also be found in the urine. Often a full blood screen is done at this time to assess if there are any other changes

in other organs (such as the liver and kidney). A urine sample may also be taken to assess if there is an infection in the bladder or kidneys.

## **Treatment of Diabetes Mellitus**

If the animal has stopped eating and has a build-up of ketones in the blood (Diabetic Ketoacidosis), it may need to be hospitalised for intensive treatment with intravenous fluids and insulin therapy until it is stable.

Once an animal is stable and eating and drinking normally treatment involves insulin injections as well as dietary changes and a set exercise routine if possible. Insulin injections under the skin are usually required twice a day and are usually done morning and night as close to 12 hours apart as possible. Although giving the injections can be a little overwhelming at first it becomes easier with practice and soon becomes part of the regular household routine. Your veterinarian will explain how much insulin to use and will be able to show you how to give these injections at home. If you are not sure that your pet got the entire dose of insulin, it is best NOT to repeat the dose, just give the next dose as scheduled.

The insulin injections are usually given just under the skin at the back of the neck, between the shoulder blades. Most dogs and cats do not even notice the injection. It is best to offer a meal first, and when they have eaten and/or are eating, then give the injection. It can be dangerous to give an insulin dose to your cat or dog if they have gone off their food and do not eat. Usually dogs should only be fed morning and night. No additional food should be fed in between times and the meals should be of equal size morning and night. However cats, and some dogs, may be better off with a “grazing” pattern of eating with food available at all times. Your veterinarian will instruct you on the best food to offer and when.

Twice daily injections of insulin have to be continued for life for all diabetic dogs. Cats may not always require insulin therapy and can sometimes be managed on other medications. In cats there is also the potential for the diabetes to resolve (“remission”) if the pancreas is able to improve its insulin secreting ability.

The amount and type of insulin can vary – as can the syringes that the insulin is given by. Make sure that you always obtain the correct syringes from your veterinarian for the insulin that you are using. Be sure to use a new syringe for each insulin dose. We are more than happy to dispose of your used syringes here at the clinic.

All animals are different and so initially regular checks to monitor the blood glucose levels, and therefore the amount of insulin to be given, will be required. Your veterinarian will be able to tell you how often these checks will be required. Often these checks will initially be every 2 to 4 weeks and will require that your pet stays a day in hospital for regular blood glucose testing to occur.

## **Monitoring and Treating a Diabetic at Home**

Often it is best to start a diary for a diabetic at home. This makes it easier to monitor not only how much they are eating and drinking but also if they are gaining or losing any weight. Urine reaction test strips can also be used (available from your veterinarian or a chemist) if necessary to monitor the levels of glucose and ketones in their urine.

### ***Drinking***

A diabetic animal should have a source of clean water available at all times. The normal water intake for a dog or cat is around 60 to 100ml per kg of body weight in a day. This will vary with temperature and amounts of exercise but excessive drinking is a sign of unstable diabetes. Initially the water intake may have to be measured daily. Once a diabetic is stable it may only be required to measure how much water is being drunk once or twice a month.

## ***Eating***

Regulation of both exercise and diet helps all diabetic animals – usually we aim to feed 50- 70kcal/kg/day divided into twice daily feeds. If your animal is underweight this may be increased – if overweight it may be decreased.

For cats a low carbohydrate, high protein diet is ideal. Your veterinarian can recommend appropriate diets for your pet. Treats and any fatty foods should be avoided. If it is not possible to change your pet's diet then regulation will have to be worked out around whatever your pet will eat.

## ***Insulin***

The initial dose of insulin your pet goes home on is unlikely to be the dose they stay on forever. Sometimes a lot of fine-tuning is required to get the dose of insulin just right for your pet. Not getting enough insulin will result in hyperglycaemia (high blood glucose). If this happens your animal will drink excessively, be very hungry and have a lot of glucose or even ketones present in the urine. *You should never change your pet's insulin dose without first consulting your Veterinarian.*

Getting too much insulin, not enough food or over exercising can result in a low blood glucose or hypo-glycaemia. Hypoglycaemia can be life threatening and the symptoms of this are varied but can include falling over, appearing very 'spaced out', shaking, lethargic or reluctant to move and will eventually progress to seizures. If you think that your pet may be hypoglycaemic, put some honey or glucose syrup on your pet's gums and then see a vet as soon as possible.

It is important to handle your insulin carefully! Insulin molecules are fragile and shaking the bottle can result in damage to the insulin and render it ineffective. Roll or gentle invert your insulin bottle to mix the insulin prior to drawing up the insulin dose. It is also important to keep the insulin in the fridge and transport it in a cool pack if travelling longer distances.

## ***Urine monitoring***

Sometimes your veterinarian may wish you to monitor the amount of glucose and ketones in your animal's urine and this can be done via glucose and ketone urine test strips available from most chemists and your vet. Initially you may need to do this every day to start with and then on a weekly basis if necessary.

*Ketones:* We always aim for negative ketones. The presence of any ketones in the urine could mean your pet is becoming unstable and you should phone your vet clinic straight away.

*Glucose:* To start with we will not be too worried about how much glucose there is in the urine. A negative glucose means that your pet may be getting too much insulin and be at risk of a hypoglycaemic (low blood glucose) episode. Eventually we would like to see the glucose in the 1+ or 2+ range.

## **When to return to hospital/or ring your veterinarian**

Your veterinarian will advise you as to how often a recheck is required and if any adjustments need to be made to your animal's insulin dose. However, you should ring your veterinarian or bring your pet in for a recheck if you note any of the following:

- Your pet seems to feel ill or is not eating
- Your pet is losing weight but still seems to have a ravenous appetite
- Your pet seems to be drinking or urinating excessively

- Ketones are present in the urine for three days in a row
- Your pet becomes disorientated or groggy - If your pet appears wobbly, 'spaced out' or appears 'drunk', the blood sugar level may have dropped too low and may have become hypo-glycaemic. This usually occurs after too much insulin has been given. First try to get your pet to eat. If they will not eat place a small amount of glucose syrup or honey on their gums and then contact your veterinarian immediately.