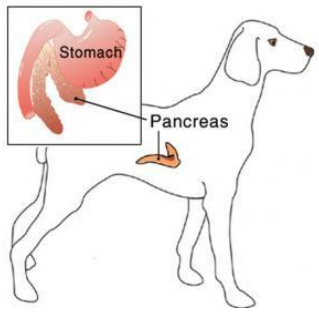
Diabetes mellitus

What is diabetes?

Diabetes mellitus is a condition caused by either an absolute or relative insulin deficiency. Insulin is a hormone produced by specialized cells in the pancreas, and is responsible for helping glucose move out of the bloodstream and into the organs where it is required for energy. This results in abnormally high glucose levels in the blood and urine, while the vital organs are being starved of the energy they need to function. There are two types of diabetes:



TYPE 1 DIABETES – Is the most common type present in dogs, and occurs when there is insufficient production of insulin by the pancreas. Pancreatitis (inflammation of the pancreas) is very common in dogs, and can cause damage to the cells responsible for producing insulin, which leads to deficiency. In other cases, type 1 diabetes may be caused by destruction of the pancreatic cells by an abnormal immune reaction or may be a congenital problem. Type 1 diabetes requires lifelong insulin therapy.

TYPE 2 DIABETES – Is the most common type present in cats, and occurs when the pancreas produces insulin, but the insulin does not function effectively due to the presence of concurrent disease, pregnancy, certain drugs or obesity. After awhile, untreated Type 2 diabetes can result in damage to the pancreatic cells and lead to Type 1 (insulin dependent) diabetes. Type 2 diabetes may require lifelong insulin administration, but if diagnosed and treated early enough, some cats may enter diabetic remission.

What are the signs of diabetes?

Signs of diabetes mellitus in dogs and cats include:

- Weight loss
- Excessive thirst and urination
- Variable appetite
- Lethargy
- In advanced cases, vomiting, diarrhea or diabetic coma may occur.

How is diabetes diagnosed?

Diabetes is diagnosed by demonstration of persistently high blood glucose levels in fasted animals, coupled with the presence of glucose in the urine. Sometimes blood glucose levels will be high in non-diabetic animals (especially cats) that are stressed, and so we need to confirm

the diagnosis by repeated blood samples and with urine samples. A full blood screen is recommended in patients suspected of diabetes to ensure other conditions such as Cushing's disease or kidney failure are excluded as they may present with similar signs, and may complicate treatment of diabetes. A urine culture is also recommended in newly diagnosed and unstable diabetics as urinary tract infections are very common in diabetic patients.

How is diabetes treated?

The mainstay of diabetic treatment is insulin supplementation, which is mostly lifelong (except for some cats). However, there are also many other lifestyle factors that can improve the response of the diabetic to treatment.

DIET – It is vital that diabetic dogs and cats receive a diet that is consistent, and quantities that maintain a healthy body weight. As insulin is generally given twice a day, daily food intake should be divided into two equal portions and given just prior to insulin. Some cats prefer to graze, and this may be OK, but it is very important that dogs have set meals. Diet recommendations for diabetics vary depending on the individual patient and the species, but generally:

DOGS – benefit from a diet that is low in fat and high in soluble and insoluble fibre. The fibre content of the diet will help slow the release of energy from the food and lead to better diabetic control. Since pancreatitis is a common underlying problem in diabetic dogs, low fat diets help to prevent flare-ups, and prevent obesity which can reduce the effect of insulin treatment. We recommend Royal Canin weight control or Hill's w/d foods.

CATS-diet is critical in cats, and some cats can eventually have their diabetes controlled by diet alone. Cats benefit from a diet that contains high levels of good quality protein, low levels of carbohydrates and moderate fat content. Cats do not cope well with high quantities of carbohydrates (cereals and grains) in their diet, and as protein releases energy more slowly than carbohydrates, diabetes is better controlled with a high protein diet. It is important that diabetic cats are also maintained at a healthy body weight to maximize the effect of insulin and the chances of diabetic remission. We recommend Royal Canin diabetic food or Hill's m/d.

EXERCISE – Like diet, it is important that exercise levels are consistent in diabetic animals, but regular gentle exercise is beneficial in preventing obesity and reducing the risk of insulin resistance in the body.

INSULIN – There are different types of insulin and each animal will have individual insulin requirements. It may take 4-6 weeks or even longer to determine the appropriate insulin dose for your pet, and after each dose adjustment we will recommend blood testing 1-3 weeks later to assess how they are responding to the new dose. We generally start animals on lower doses to prevent the risk of hypoglycaemic events (where the blood glucose drops too low) and then gradually increase the dose each week until we find the right one.

Some important information about insulin:

-It must be given by injection under the skin (subcutaneous injection) and works best if the sites of injection are rotated.

-It should be stored refrigerated, or at least below 25^{o}C and expiry dates should be strictly observed.

-It should be gently rotated to mix before injection, but never shaken.

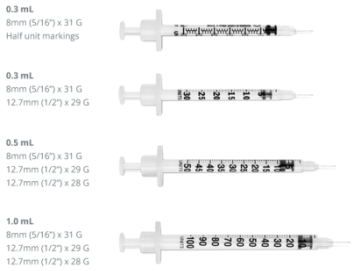
-Time to reach peak effect and duration of action will vary depending on the type of insulin given and with individuals.

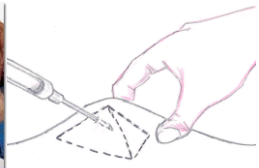
Protocol for insulin administration

-Feed your pet before giving insulin. Normally insulin is released by the body in response to eating and if your pet receives insulin without food, blood glucose levels may drop dangerously low. If your pet does not finish their meal, contact us for advice regarding administration of insulin, generally doses should be halved.

-Remove insulin from the fridge and invert gently several times to mix

-Draw up the required amount of insulin into a new insulin syringe. Insulin is measured in ‘units’ and each line on the syringe represents 1 unit. Some types of insulins have different concentrations to human insulins and require special syringes to ensure accurate dosing. Ensure there is no air in the syringe. OR, if you are using an insulin pen, attach a new needle to the pen, dial up the required number of units, discharge to prime and then follow instructions below.



-Pinch a piece of loose skin on your pet to create a little triangle of skin. Usually somewhere on the neck will be a good site to choose.

-Insert the needle into the bottom centre of the triangle you've created, and then inject the full dose of insulin. The injection site can be massaged gently after this if desired.

-Place the used syringe (or needle) in a sharps container. When full, these can be delivered to us for disposal.

Potential complications of insulin therapy

HYPOGLYCAEMIA – Hypoglycaemia occurs when the insulin dose exceeds the body's requirements. Hypoglycaemia is serious and may potentially be fatal. Signs of hypoglycaemia include:

- Lethargy
- Weakness and collapse
- Muscle twitching and seizures
- Coma

If you see these signs in your pet, it is critical to smear glucose syrup or honey on their gums as soon as possible, and bring them straight up to us for treatment.

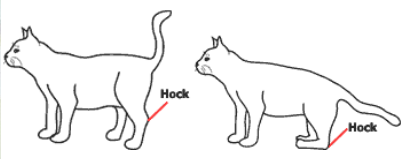
UNCONTROLLED DIABETES – Uncontrolled or poorly controlled diabetes mellitus can result in several complications:

-Development of cataracts in the lenses (dogs only).

-Development of diabetic ketoacidosis. This occurs when the body is starved of glucose energy, and instead breaks down fat stores to supply energy. Short term this is a good solution, however long term the by-products of fat metabolism causes an accumulation of acid in the body, which has many serious implications and can be life-threatening.

-Development of hyperosmolar coma. This occurs when the excess glucose in the bloodstream encourage the movement of fluid out of the cells, resulting in severe dehydration of vital organs including brain, kidneys and heart and resulting in low blood pressure and collapse.

-Development of nerve problems (diabetic neuropathy - predominantly cats).

-Poor immune function and risk of secondary infections.

MONITORING DIABETES

The monitoring of diabetic patients is critical to ensure the best possible outcome. Important clues about how well stabilized your pet is can be monitored by you at home and if possible, it is great to keep a daily record of the following parameters:

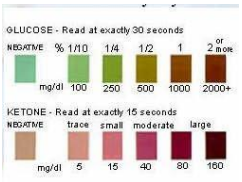
-Demeanour-is your pet his/her normal happy self?

-Appetite should remain stable.

-Water consumption-increased water consumption (more than 70ml/kg/day) is indicative of poorly controlled diabetes.

-Body weight should remain constant in stable diabetics, although weight loss may be valuable for some obese pets in helping to control the disease, but this needs to be discussed with your vet.

-Urine glucose/ketone monitoring-spot urine checks every day or every few days can help to identify poorly controlled diabetics. Urine samples from diabetic animals should not be consistently negative for glucose, and should not contain ketones. Either of these findings could indicate that an insulin dose adjustment is required.



-Blood glucose curves-are essential for the initial stabilization of diabetics and for troubleshooting problems. This is generally performed in the clinic and we will advise you as to the frequency at which these are required.

-Fructosamine test-fructosamine levels give us an indication of average blood glucose measurements over a 3 week period. This test is most often used in cats, as blood glucose curves are often inaccurate due to the effect of stress in cats.

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Daily Insulin Dosing and Monitoring Chart for ______________________

Date	**Insulin Dose**		**Food intake**		**24 hr water intake (ml)**	**Urine**		**Demeanour**
	AM	PM	AM	PM		Glucose	Ketones	