

DIABETES MELLITUS

I have been told my dog has sugar diabetes. What does this mean?

Diabetes mellitus, (DM) or sugar diabetes, is a complex disorder of carbohydrate, fat and protein metabolism caused by the body's inability to produce or to utilise adequate amounts of insulin produced by specialised cells in the pancreas.

Sugar diabetes should not be confused with Diabetes Insipidus (Drinking diabetes). This is a very rare condition in dogs. It results in inability to concentrate urine and thus regulate water content in the body.

Are some dogs more prone than others?

Diabetes mellitus commonly affects middle aged, entire bitches.

What causes the disease?

DM is a disease of the pancreas. This gland, located near to the stomach and duodenum, comprises two types of cells. One group produces digestive enzymes which are secreted into the bowel by the pancreatic duct. The other group, which are scattered throughout the pancreas in areas known as the Islets of Langerhans, are responsible for the production of insulin which is circulated to all parts of the body via the bloodstream.

Why is insulin so important?

Insulin is the hormone that allows glucose to enter the body cells from the blood stream in order to provide the energy needed for life. If there is a lack of insulin or the cells become resistant to it glucose builds up in the blood stream. This is **hyperglycaemia**. When the amount of circulating glucose exceeds the so-called renal threshold it is passed out in the urine. This is **glycosuria**.

What causes the problems with insulin?

Most commonly beta cells are gradually destroyed and not replaced, resulting in insulin deficiency, (**hypoinsulinism**). This in man is known as Type 1, or Insulin Dependent Diabetes Mellitus. It can be due to a variety of causes including autoimmune problems and environmental factors such as drugs or infectious agents. Less commonly destruction of beta cells may be the result of tumours, injury or long standing or recurrent inflammation (chronic pancreatitis)

Are there any other causes?

Sometimes other diseases of the pancreas as well as liver, and also Cushings disease can occur simultaneously with DM.

- In the bitch DM often occurs shortly after a season. This is when her cycle is progesterone dependent. This hormone causes insulin resistance and hence hyperglycaemia.
- Similarly cortisol or treatment with cortisone type drugs can sometimes cause hyperglycaemia and signs of DM. Thus sugar diabetes is often associated with Cushings Disease.

- Obesity leads to insulin resistance which in turn may lead to DM.

Can insulin be given by mouth?

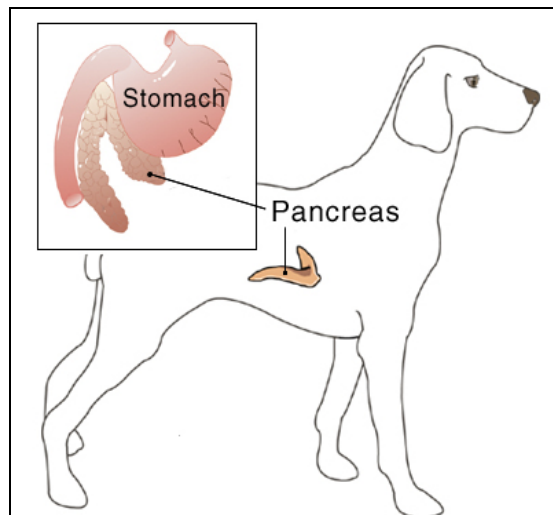
Unfortunately insulin is digested in the stomach and small intestine and consequently cannot be administered orally. It has to be given by injection but we will carefully go through the procedure with you until you are confident. It is not as difficult as it appears initially.

Why is it then that some human diabetics do not have to have daily insulin injections and are controlled with tablets?

Type 2, or non insulin dependent DM does occur in people and drugs given by mouth will stimulate the remaining insulin producing beta cells in the pancreas to produce or release sufficient insulin to reduce the amount of glucose circulating in the blood. Unfortunately this type of DM is virtually unknown in dogs.

Why is this hyperglycaemia and glycosuria so important?

From the foregoing it will be seen that with a deficiency or an inability to utilise insulin the cells become starved of energy. The body starts to break down fat and protein to use as an alternative energy source. This results in weight loss and at the same time the dog's appetite increases. Glucose accumulates in the blood stream in such a quantity that it spills over into the urine. Since it has to remain in solution, it takes with it vast quantities of the body's vital fluids. Thus the dog is urinating frequently and to avoid dehydration begins to drink vast quantities.



The classical signs of DM are:

- Weight loss
- Ravenous appetite
- Increased thirst
- Increased urination

Is this how DM is diagnosed?

No. Unfortunately these signs are not confined just to DM. Other diseases can also cause them. Other clinical signs frequently noted with DM include

- Urinary infections
- Cataracts
- Muscle wastage

Onset is usually relatively slow over a number of weeks but left untreated can result in vomiting, poor appetite, depression, coma and death due to dehydration and renal failure.

How is it diagnosed?

- The clinical signs discussed above play an important part
- Blood tests indicating a persistently high level of blood glucose - **hyperglycaemia**
- Urine tests indicating glucose - **glycosuria**

Sometimes other diseases such as Cushings disease as well as liver and other pancreatic disease can occur simultaneously.

What is the treatment?

Treatment may involve changes in diet together with standardisation of diet and daily exercise together with the administration of insulin by injection.



Dogs that have had DM for some time and have been using protein and fat as an energy source often have substances known as ketones circulating in the blood which may be detected in the urine. These dogs often have to be hospitalised and stabilised using intravenous fluids together with treatment for any complicating disorders. However most routine cases can usually be started on treatment as outpatients but usually have to attend daily for the first few days until the diabetes is gradually brought under control.

During this period we will teach you how to test urine on a daily basis and how to calculate the daily insulin dose. If you are unsure of the procedure it is imperative that you always ring before administering any insulin.

Is management difficult?

At first the task appears daunting but management of the diabetic dog depends basically upon as much standardisation as possible. Feeding, exercise and medication including insulin have to be given at the same times each day. There should not be any radical change in the quantity or type of food, nor the number of meals per day without consultation with us.

What happens if I am away from home when my dog should be fed or receive the injections?

In such a case it is important to pre-plan and enlist the help of friends or relatives. Should this not be possible, discuss the problems with us, we will do our best to help.

What about holidays? If we take the dog with us will that not cause stress?

The excitement of the impending trip can cause fluctuations in urine glucose values upon which you depend for the estimation of the insulin required. However we will discuss this very carefully with you and remember we are only a phone call away if you are having problems.

What happens if I have to go away and cannot take my dog?

The ideal situation is to keep your dog in your home and get a house sitter who can administer the insulin. Alternatively you may have a friend or relative who is prepared to pop in frequently. If this is impossible we may be able to help with arranging hospitalisation or selecting a suitable nearby boarding kennels that will undertake treatment of a diabetic dog. The stress of strange surroundings without familiar faces can temporarily cause destabilisation. However we will discuss this with you fully.

What happens if too much insulin is given?

This can happen from time to time and results in too low a level of circulating blood sugar (glucose) which is known hypoglycaemia. For example when we are instructing you regarding the routine we advise that you feed the dog just before you administer the insulin. Often then your dog is too busy eating to even notice the tiny injection. Also you are assured that he is eating. If he is not interested in eating, do not give any insulin and telephone us.

Is hypoglycaemia dangerous?

It can be. If it is due to too much of insulin the first signs are usually that the dog appears tired and almost comatose. A few sugar lumps, if necessary forcibly pushed down the throat like tablets usually brings about a response in a few minutes. Alternatively sugar or glucose powder can be dissolved in water and spooned or dripped into the dog.

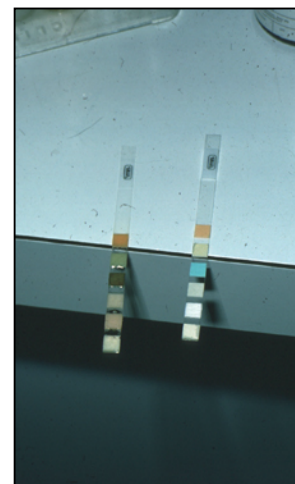
Is that not likely to cause hyperglycaemia?

Hyperglycaemia is possible but it will be counteracted with the next insulin injection since it will be apparent from the greater amount of glucose in the urine when next it is tested. Hypoglycaemia, left untreated, can result in seizures and loss of consciousness. Should this occur, please telephone without delay. **This is an emergency.**

If you have any concerns or questions please feel free to discuss them with us.

Will treatment be very expensive?

Laboratory tests and stabilisation which may require hospitalisation initially can be expensive. Once stabilised the cost of insulin and urine analysis materials is reasonable. However regular check ups and blood tests will be necessary and therefore the long term financial



Urine test strips.

commitment in an uninsured dog can be considerable. A reasonably well stabilised diabetic dog can live a long and happy life.

Once we get the hang of it, presumably we will calculate the daily insulin dose for the dog. How is this done?

This will be explained very carefully and we can supply handouts and a video to help with this. Insulin requirements are estimated either from the dog's water intake or from determining the quantity of glucose in the urine. Once the diabetes is under control there should only be a minimal amount of glucose present in the urine each day. The technique of analysing the urine for glucose content and also administering the injection will be carefully explained. Please feel free to contact us if there are any aspects that cause concern.