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DIABETES

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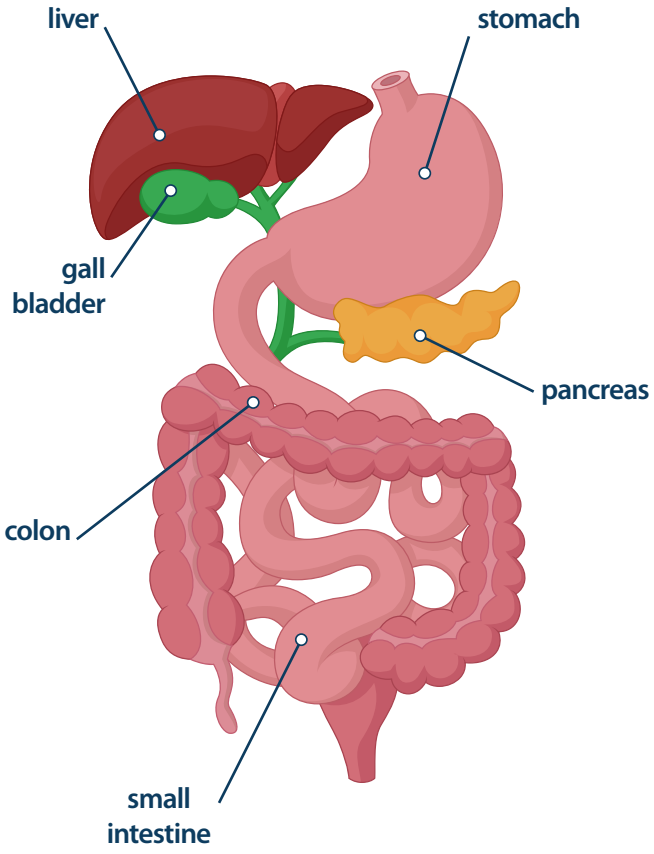
The role of the pancreas

The pancreas is an abdominal organ made up of two parts. One secretes insulin, which makes glucose (sugar), fatty acids, amino acids and other molecules enter the organs. They then use the molecules as fuel to perform their functions. The other part of the pancreas secretes enzymes that digest food in the intestine.



Types of diabetes

Two types of diabetes exist: I and II. With type I, the pancreas does not produce enough insulin. With type II, the pancreas produces insulin, but it is ineffective: the cells do not respond to it.

Type I diabetes is more common in dogs. The disease occurs when the part of the pancreas that secretes insulin is destroyed, either by the immune system or by the inflammation in the pancreas during pancreatitis.

Symptoms

"Uncomplicated" diabetes

Without insulin, the various fuels do not enter the organs' cells, which are then deprived of food. Result: the dog is hungry and eats more.

The body draws on its glucose, fat and proteins stocks to produce the glucose, fatty acids and amino acids it needs: the dog loses weight.

The excess glucose gets in urine and attracts water: the dog pees more.

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Because he pees more, he is thirsty: he drinks more water.

Those 4 symptoms are most often observed in the early stages of the disease. At that moment, dogs often don't look sick. However, complications will appear if they are not treated.

Cataracts
- Grey veil in the eyes
- Loss of vision

Skin infections
- Itching
- Oily and dull coat
- Crusts, scabs, pimples, etc.
- Foul body odor

Urinary tract infections
- Sticky, bloody and foul smelling urine on the floor
- Pain while peeing
- Frequent requests to go outside to pee
- Frequent small amounts of urine

"Complicated" diabetes

In the absence of insulin, fatty acids produced by the breakdown of fat tissue accumulate in the blood and are transformed into ketone bodies. These ketone bodies are toxic and when there are a lot of them, they poison the dog. This is called ketoacidotic diabetes or "complicated" diabetes. The animal, which was doing fairly well before, becomes very ill.

Here are the typical symptoms:
- Depression and weakness
- Dehydration
- Loss of appetite
- Vomiting
- Diarrhea
- Collapse
- Death

Dogs who develop ketoacidotic diabetes must be taken to the vet immediately!!!

Risk factors

Certain factors predispose dogs to diabetes and interfere with treatment because they prevent insulin from working. That is probably what happens when a dog suddenly does not respond as well as before to insulin. These are the risk factors:
- Obesity;
- Certain diseases (eg hyperadrenocorticism or Cushing's disease, pancreatitis, dental, urinary or skin infection);
- Certain medications (eg cortisone);
- Pregnancy;
- Dog breed (eg Schnauzers).

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How is diabetes diagnosed?

The diagnosis is made by identifying elevated blood and urine glucose levels in a symptomatic dog.

Managing concurrent diseases

It is important to perform further testing to try to identify and rule out some of the risk factors mentioned earlier:

- **Blood test.** To detect anemia, pancreatitis, inflammation or infection, and to check the kidneys' and liver's condition, etc;
- **Urine analysis and culture.** To detect infection, stones, abnormal cells, etc.;
- **Blood pressure.**

If necessary, additional tests may be recommended.

How is diabetes treated?

Dogs that do not eat, that vomit and that are weak or dehydrated need to be hospitalized.

Once stabilized, we must:

- give them insulin;
- control their weight;
- change their diet.

Insulin

Several types of insulin exist. The difference between them is mainly related to their speed and duration of action.

The 2 types of insulin mainly used are Caninsulin® (porcine zinc insulin) and Levemir® (detemir insulin). They control most dogs' blood sugar levels better than others. They have to be administered subcutaneously, twice a day.

Each type of insulin comes with its own syringe. It is very important to use the one that is compatible with the insulin that the veterinarian prescribed.

Weight control

Energy needs

A dog's energy needs represent the amount of calories that he must consume to be able to perform his daily activities (eg sleeping, eating, playing, exercising, etc.). Knowing how many calories dogs need allows us to calculate precisely how much food they should eat. This calculation is important to do in order for them to reach and keep a healthy weight. Obese dog should lose 1-2% of their weight each week.

Exercising

Dogs with diabetes need to be more active. If they are obese, exercising will help them lose the extra weight. If they are too skinny, it will help them build muscle mass. Furthermore, physical activity makes insulin work better and reduces stress.

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Nutrition

Food

Diabetic dogs should eat food that improves glucose metabolism and use. The food also needs to facilitate insulin activity at the cellular level.

Obese dogs should eat fibre rich weight loss food. Thin dogs and those whose weight is adequate should eat a high quality maintenance food or a diabetic food that is not slimming, but still contains a lot of fibre.

It is best to give them equal portions of food at the same times each day to keep their blood sugar levels as stable as possible.

Moist food controls diabetes better than dry food because it contains:

- **more water.** Water relieves dogs' hunger because it takes up space in the stomach. Furthermore, water provided by food improves their hydration and helps replace the one lost in urine.
- **less sugars.**

Treats

The amount and type of treats offered should be carefully monitored as well. Indeed, several treats on the market are very high in sugars and calories. Too much can interfere with diabetes control and weight loss.

Does your dog eat treats? Let his vet know, to make sure they are compatible with his treatment. If not, he or she will recommend tasty ones suitable for his condition and calculate how much he is allowed to eat.

Interactive feeders

An interactive feeder is a special bowl or a toy in which kibbles or treats are placed. Dogs have to get them out to eat them. They lose weight more easily because:

- they exercise more;
- they eat only small portions of food at a time, preventing large amounts of sugar from getting in their blood all at once and turning into fat;
- they eat more slowly, which facilitates digestion and the sensation of fullness.

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Treatment complications

Giving insulin to dogs can lower their blood sugar too much. Such hypoglycemia can occur, for example, if the prescribed dose of insulin is too high or too much is taken from the bottle.

Here are the symptoms to watch out for:
- Depression and weakness
- A staggering gait
- Dizziness
- Stiffness
- Seizures
- Coma
- Death in severe cases

It is practical to have a blood glucose meter at home to monitor dogs' glycemia. If a dog shows at least one symptom listed above and his blood sugar level is below 3.5 mmol/L, he must be given 1 to 3 tbsp. of corn syrup or honey to drink, depending on his size, every 10 minutes until his blood sugar level reaches at least 4 mmol/L. If he is unable to swallow, it should be applied on his gums.

If a glucose meter is not available, the dog should still get the syrup or honey, just to be on the safe side. Again every 10 minutes until he gets back to his normal self.

Immediately contact a veterinarian to find out what to do next.

Monitoring

All dogs respond differently to treatment, so following up on the disease's progression must be tailored to each individual's needs.

It's mainly dogs' symptoms and weight, as well as their blood and urine glucose levels, that will be monitored closely.

The glucose curve

Doing a glucose curve consists of measuring the blood glucose level a few times throughout the day. The goal is to make sure that the insulin dose is adequate: neither too low nor too high.

The curve can be performed at the clinic by the veterinary staff or at home by the owner. In the latter case, the results and the meals and insulin administration times should be noted and sent to the veterinarian. He or she will analyse the data and decide if the insulin dosage should be adjusted or not.

When should a glucose curve be done?

About 10 days after beginning the treatment and changing the insulin type or dosage, then 2 to 4 times a year.

Once diabetes is under control, blood glucose levels can be checked at random, regularly. If they are too high or too low, a curve should be done.

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How can dogs' blood glucose levels be measured at home?

Two devices are available on the market: the AlphaTRAK$_2$® blood glucose meter and the FreeStyle Libre® System.

AlphaTRAK$_2$® glucose meter

FreeStyle Libre® Glucose Monitoring System

AlphaTRAK$_2$®

The AlphaTRAK$_2$® blood glucose meter measures the amount of glucose in a drop of blood taken from the edge of one of the dog's footpads. It is designed specifically for animals.

How does the AlphaTRAK$_2$® work?

The person pricks the footpad with a needle, right next to the skin.

A small, well-defined drop of blood appears.

The person touches the blood with one of the stick's black areas.

At the beep, the blood glucose level appears in the glucose meter's window.

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The FreeStyle Libre® System

The FreeStyle Libre® System is a glucose monitoring device consisting of a sensor and a scanner. The scanner picks up the blood glucose level when swept in front of the sensor glued to the dog's back skin. During an 8 hour period, 4 measurements can be recorded. Each sensor works for 14 days.

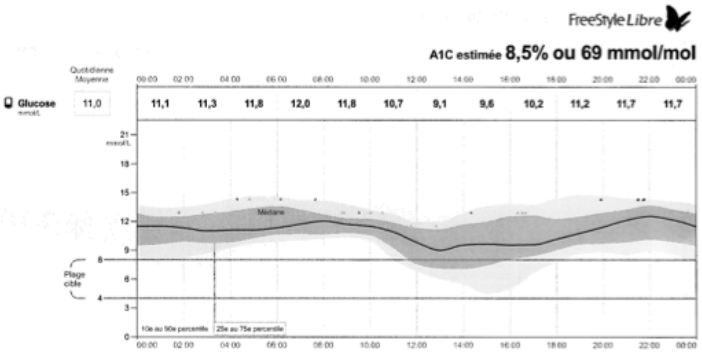
This device is designed for humans, but it is being used more and more with animals. The sensor is generally well tolerated and no pricking is required. In addition, it automatically generates the blood glucose curve, records daily data and provides weekly summaries in easily readable graphs.

How does the FreeStyle Libre® work?

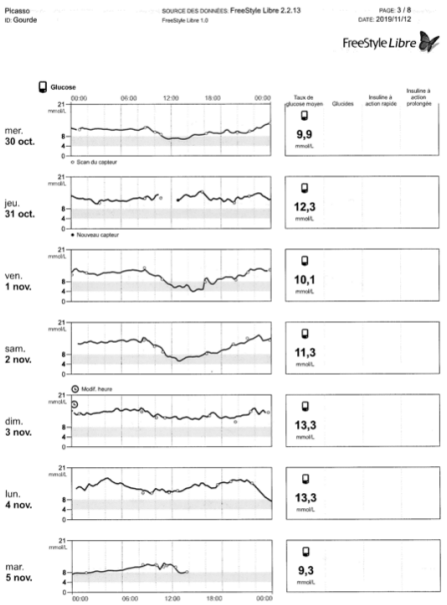
The sensor is glued to the dog's skin.

The person sweeps the scanner in front of the sensor.

The blood glucose level appears in the meter's result window.



A typical example of a blood glucose curve.



A typical example of a weekly data summary.

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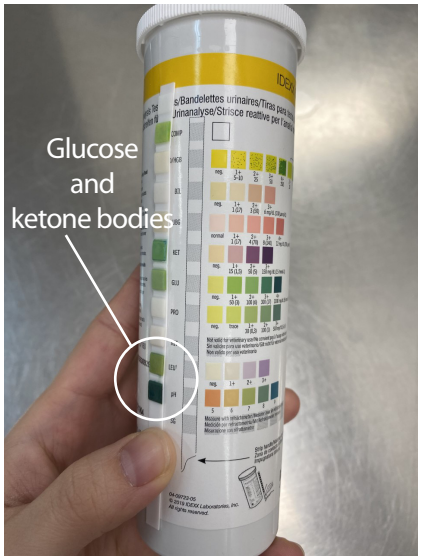
Glucose in urine

When blood glucose exceeds a certain limit, it ends up in urine. Thus, checking the dog's urine for glucose regularly at home might give a clue as to the quality of his diabetes control. Large and persistant amounts of glucose in urine suggests that it is not under control. In that case, the veterinarian must be informed.

It is important not to change the insulin dosage without first getting his or her approval.



Urine test strip showing the presence of glucose and ketone bodies.

Additional tests

A physical exam and additional tests should be done at least once or twice a year afterwards, even if the pet is doing well. To make sure that he has not developed conditions or diseases that might interfere with the action of insulin.

Anesthetizing diabetic dogs

Even diabetic dogs sometimes need to be anesthetized. To ensure their safety during anesthesia, additional precautions are required:

- **Fasting.** Six hours maximum vs. 12 hours for non diabetic dogs.
- **Intravenous fluids.** With added sugar.
- **Measurement of blood glucose before anesthesia.** Depending on the result, either half the insulin dose, or no insulin at all, is given.

The final word

Dogs often develop diabetes, mainly type I. Even though this type is irreversible, their disease can still be managed. With insulin injections, a good exercise and weight control program, and a proper diet.

Their quality of life can be good if they respond to treatment. It is important to closely monitor their health to make sure that they do not develop conditions that can interfere with the insulin's action.

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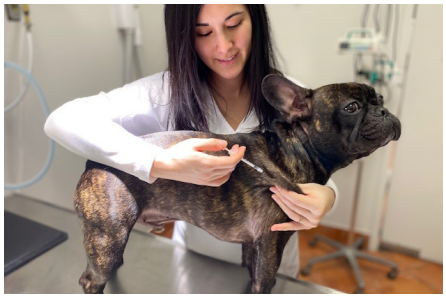
Insulin handling

Keep the vial in the refrigerator.

Before withdrawing a dose, invert the vial a few times to mix the product. Don't shake it.

Draw the prescribed amount and tap the syringe's end to expel the air bubble that entered during sampling.



Lift the skin on the side of the dog's thorax to form a small "tent" and insert the needle at its base. If it is well positioned under the skin, it should move freely.

Slightly withdraw the plunger. If no blood comes, inject the insulin.

Change the injection site and syringe each time. Do not throw it in the trash. Rather, bring it back to us. We will dispose of it safely.

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HEALTH RECORD

Recommendations

_____ diabetes recommendations

Diabetes monitoring							
Date (DD-MM-YYYY)	Insulin / Syringe	Posology and route of administration	Food	Amount of food and number of meals per day	Weight Body score	Prescribed by Dr.	Procedures to be done

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Working together for animal health and wellbeing.

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