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## DIABETES MELLITUS

### WHAT IS IT?

Diabetes mellitus is a chronic endocrine disorder that occurs in dogs and cats. High blood sugar (hyperglycemia) results when the pancreas is unable to produce enough insulin to meet the animal's requirements.

Insulin is a hormone which is needed to transport glucose (blood sugar) as well as certain amino acids and minerals through the blood to energy producing cells. When a lack of insulin occurs, glucose cannot move into the cells and the glucose level in the blood rises to abnormally high levels.

### SIGNS OF DIABETES

An animal with diabetes mellitus will exhibit some or all of the following symptoms: weakness, increased thirst, frequent urination, rapid weight loss, depression and abdominal pain. An animal may also show signs of either increased hunger or lack of appetite. In some animals, the sudden development of blindness due to cataract formation may indicate diabetes. Another common sign of diabetes is urinary tract infections. All the sugar in the urine makes the bladder an excellent incubator for bacteria.

### CAUSES

Diabetes mellitus in dogs and cats is caused by damage to the pancreas. Predisposing factors are obesity, genetic predisposition, poor diet, hormonal abnormalities, stress and drugs. The sex of the animal can also be a predisposing factor. In dogs, females are affected twice as often as males. In cats, diabetes is more prevalent in males.

### DIAGNOSIS

It will be necessary for your pet to fast for a short period of time so that its blood sugar level can be tested and a urine check can be done. Often your pet is hospitalized for one or two days to help insure the accuracy of this test. Urinary tract infections, other hormone disorders, infections, or a build-up of chemical compounds called ketones in the body often complicates diabetes. Provided these or no other complications are present, the fasting blood sugar and urinalysis tests will help determine whether or not your pet is diabetic. If there are complications, more testing may be necessary.

### TREATMENT

Treatment requires a commitment of time management from you, the owner. There is no cure for diabetes mellitus, but as with humans, it can be controlled with insulin injections, diet, and exercise management. With such therapy, your pet can lead a happy, comfortable life.

Once your pet has been diagnosed with diabetes mellitus, its specific insulin requirements will need to be determined. As each pet's insulin needs are quite unique, there is no way to predict how much insulin your pet will require. Initially, your pet may need to be hospitalized for 2 –4 days in order to determine its specific needs. This is accomplished by giving the pet an insulin injection and testing the blood sugar levels at regular intervals throughout the day. These results are used to determine your pet's

initial insulin requirements. Because your pet's insulin needs may change once it returns home, due to changes in diet, exercise and certain environmental stresses, periodic reevaluation over the next two weeks is recommended until satisfactory control is achieved. Once control is achieved, further evaluation should be completed every 2-4 months.

## **HOME CARE**

You must provide your pet daily injections of insulin for the rest of its life. Oral medication is rarely effective for diabetic animals. It is also important that the insulin injections are given at the same time each day.

The injection is given just under the skin and is not painful to your pet. You will be shown how to administer the injection. Most animals become accustomed to the injection and, if paired with attention and treats, will often look forward to it.

## **THE INSULIN DOSE**

The type of insulin and the daily dose are tailored to meet the needs of each animal. Some may require once daily injections, others will require twice-daily treatment. Some may require one type of insulin; others may need a combination of different types of insulin. Other medications may also be prescribed, depending on concurrent complications.

When regulating a diabetic animal's blood glucose level, the goal is to keep it between 80 and 150 mg/dl. The recommended dose of insulin determined while your pet was hospitalized in the clinic may need adjustment once your pet is home. This is because the food and exercise your pet receives at home may be different.

To adjust the dose we will continue to test and regulate your pet in two ways. You will occasionally be requested to bring your dog or cat into the clinic for the day to test for blood and urine glucose levels. Also, you may be asked to monitor your pet's urine glucose at home.

## **HANDLING INSULIN AND SYRINGES**

Insulin should be kept cool at all times. Keeping the bottle in the refrigerator is the safest place. Insulin should never be shaken, as this will destroy the insulin molecule. Instead, roll the bottle in your hands for 10-15 seconds prior to drawing up your pet's dose.

The syringe and needle should be stored in protective wrappers to keep them sterile. Syringes and needles have four parts that consist of the syringe barrel, the plunger, the needle and the needle guard.

Various syringes are suitable for injecting insulin. They are marked on the barrel for measuring small amounts.

These syringes and needles are disposable or "single use" only. After injecting your pet with insulin, place the needle guard over the needle and dispose of it in a suitable container. Placing the needles in an empty 1L soda bottle is a good way to store them safely. For their safety, it is extremely important that children do not have access to the syringes or needles.

## **DRAWING UP THE INSULIN**

Set out the syringe and needle, insulin bottle and have the pet ready. Then:

1. Remove the needle guard from the needle; draw back the plunger to the desired dose level.
2. Insert the needle into the insulin bottle.
3. Inject the air in the syringe into the bottle to prevent the vacuum from forming in the insulin bottle.
4. Withdraw the plunger, filling the syringe with the correct amount of insulin.

Before injecting the pet with the insulin, check to see there are no bubbles in the syringe. If you see an air bubble, draw up slightly more insulin than the exact dose. Now, withdraw the needle from the bottle, tap the syringe barrel with your finger to move the air bubble to the nozzle of the syringe, then, gently, expel the air bubble by pushing the plunger upwards.

Now, check to see that you have the correct amount of insulin in the syringe. The correct dose of insulin is measured from the needle end or "0" on the syringe barrel, to the end of the plunger nearest the needle.

### **HOW TO GIVE AN INJECTION**

1. Hold the syringe in your right hand (or left, if your left-handed). Above is one way to hold the syringe. There are other ways and with time you will develop the one easiest to you. (You may find it helpful to begin by practicing with a syringe filled with water and injecting it into an orange.)
2. Have a friend or member of your family hold your pet as you pick up a fold of skin along the pet's back with your free hand (pick a different spot each day).
3. Push the very sharp, very thin needle through the pet's skin quickly. This should be easy and painless using an insulin needle. Take care to push the needle through one fold of skin, not into your finger, the pet's underlying muscle, or through both layers of skin.
4. Pull back gently on the plunger to make sure no blood fills the syringe.
5. With your thumb on the plunger, push the plunger further into the syringe.
6. Withdraw the needle from the pet's skin, and immediately cover the needle with the needle guard.
7. Pat your pet to reward it for sitting quietly. A reward of patting followed by the first feed for the day quickly creates a cooperative pet that may not even need to be held.

"Sterilizing" the skin with alcohol is not necessary, and may be counterproductive if it stings and causes your pet to want to avoid the injection.

Sometimes your pet may have an insulin reaction caused by a marked decrease in blood sugar. This reaction usually occurs 2-6 hours after the morning injection the earliest signs resemble a drunken state. That is, your pet will be weak and will walk with a wobbly, uncoordinated gait. This stage may progress to seizure or coma. Should this occur, give 1-2 teaspoons of Karo Syrup orally. Contact your veterinarian immediately if no improvement is seen within 15 minutes. A blood sugar level significantly below normal is an immediate threat to life and needs to be dealt with as an emergency situation.

### **WHEN TO FEED**

*When* you feed your diabetic pet is as important as *what* you feed it. Your pet must be fed the prescribed diet in the correct quantity at a regular time each day in conjunction with the insulin medication. Correct dietary management is a critical part of the successful management of the diabetic animal. As a general rule, the diabetic animal should be fed more than once a day to help maintain blood sugar at a constant level. The feeding schedule will be determined by the veterinarian, based on your pet's Glucose Curve.

## **WHAT TO FEED**

Table scraps or any foods other than the prescribed diet should not be allowed. It is important that the food your pet consumes is constant, both in ingredient content and nutrient source. Diabetic control is difficult to obtain if the composition or ingredient source of the pet food varies. Many commercial pet foods are produced from “open” formulas and ingredient can vary from batch to batch depending on ingredient cost and availability.

**Studies have indicated that high fiber, high carbohydrate, fixed formula diets lower insulin requirements and blood glucose levels.** Experts believe that fiber may cause the body to be more responsive to insulin. Fiber also slows the absorption of glucose from the intestinal tract and decreases hyperglycemia (high blood sugar).

The amount of food to feed daily will be determined by your pet’s caloric requirements. This amount should not be varied, as it will have a direct impact on insulin needs. If your pet is overweight, weight reduction is necessary. Obesity decreases the body’s tissue responsiveness to insulin (both natural and injected) and results in dangerously high blood sugar levels.

## **EXERCISE**

There are no restrictions on your pet’s normal activity. However, it is important that your pet’s exercise be moderately regulated and consistent in order to keep the insulin needs as consistent as possible.

## **HOME GLUCOSE MONITORING**

You may be asked to monitor your diabetic pet at home for the presence or absence of glucose in its urine. Most dogs and cats have a kidney threshold of 150- 200 mg/dl, meaning that after the blood glucose goes above that level it starts “spilling over” into the urine.

## **HOW TO TEST YOUR DOG FOR GLUCOSE**

1. Note the time you collect the urine.
2. Place a lead on your dog so it will be within reach when it urinates.
3. With a container, such as a soup ladle, disposable cup, or small pan, collect a small amount of urine.
4. Remove one glucose test strip from the bottle and quickly re-close the bottle. The urine may sit for a while, as it does not change chemically.
5. Dip the end of the test strip into the urine. Tap the strip to remove any excess urine, and wait 30 seconds for the color to develop. Compare the color of the test area with the colored squares on the bottle.
6. Record the result and the time period it represents on a daily record sheet for your pet.

## **HOW TO TEST YOUR CAT FOR GLUCOSE**

1. Keep your cat inside and note the time it urinates.
2. Thoroughly clean the litter box, and rinse with water.
3. Replace the litter with Nosorb crystals (supplied by your veterinarian).
4. Your cat should urinate on the Nosorb crystals (they are non-absorptive). Test this urine for glucose.
5. Take one urine glucose strip from the bottle. Dip the end of the test strip into the urine. Wait 30 seconds and compare the color of the test area with the colored squares on the bottle.
6. Record the test result and the time on a daily record sheet.

### **THINGS TO WATCH FOR AT HOME**

- Seizures
- Coma
- Lack of appetite
- Deviations of normal behavior
- Deviations of normal urine glucose pattern
- Depression
- Drunken state
- Cataracts

If your pet exhibits any of these signs please contact us as soon as possible.

### **SPECIAL CONSIDERATIONS**

Although diabetes mellitus can be controlled with insulin and diet, diabetic animals are more susceptible to other health problems. Diabetes mellitus can cause an increased incidence of infections (especially bladder infections, slowed healing, cataracts, gastrointestinal dysfunction, kidney disease, heart disease, pancreatitis and nervous system disorders.

You should not breed a diabetic female animal because it is extremely difficult to control diabetes during pregnancy, and may cause a life-threatening situation.

### **COST**

The cost of caring for a diabetic pet is an important consideration. Of course, the cost will vary somewhat depending on any additional health problems that may occur and the size of your animal. To estimate your costs, it's best to break down the treatment stages: (1) Initial diagnostic work-up, (2) Stabilization and (3) Maintenance.

Beyond the monetary cost, there is a time commitment required of owners of a diabetic pet. Such a commitment may not seem easy, but can be very rewarding for both pet and owner.

Your commitment adds to the quality of your pet's life and is paid back in years of healthy companionship.