

# **Canine Diabetes Mellitus**

*Diabetes, diabetic*

## **Affected Animals:**

The average age range for the development of diabetes mellitus in dogs is four to 14 years, with the majority of cases occurring at seven to nine years of age. Although males do develop diabetes, female dogs are twice as likely to be affected by the disease. A genetic disposition towards diabetes is suspected in breeds including the Keeshond, pulik, cairn terrier, and miniature pinscher. In addition, dachshunds, miniature schnauzers, poodles, and beagles also are frequently diagnosed with the disease. However, any dog can develop diabetes mellitus.

## **Overview:**

Characterized by high concentrations of glucose in the blood and urine, diabetes mellitus is one of the more common hormonal disorders of the dog, and the disease almost always requires lifelong insulin treatment. In addition, chronic high glucose in the blood and urine can cause severe complications including infections, cataracts, diabetic ketoacidosis, nervous system disorders, pancreatitis, and kidney disease. If left untreated, diabetic dogs will suffer from complications and an early death.

Diabetic dogs are treated with insulin injections, dietary modification and exercise. Some people with diabetes can use oral hypoglycemic drugs, but these medications typically are not helpful in dogs. In order to regulate their blood glucose levels, diabetic dogs require frequent veterinary office visits in the initial stages of treatment, followed by periodic examinations for proper maintenance thereafter.

Initially, it may be difficult for some owners to give daily insulin injections, but the majority of dog owners find this task to be manageable. With proper treatment and monitoring, many diabetic dogs can enjoy an excellent quality of life.

## **Clinical Signs:**

Commonly reported signs include polydipsia, polyuria, polyphagia, and weight loss. Depending on the stage of the disease, physical findings may include obesity, cataracts, dehydration, lethargy, weakness, and ketone halitosis.

## **Symptoms:**

Common symptoms noted in diabetic dogs include excessive thirst, increased volumes of urine, and urinary accidents. Affected dogs often have weight loss despite an

increased appetite. Other symptoms may include loss of vision, tiredness, and weakness.

**Description:**

Diabetes mellitus is characterized by high concentrations of glucose in the blood and in the urine. The disease usually results from either decreased production of insulin by the pancreas, or impaired insulin function within the body tissues. With either problem, the dog's system becomes unable to regulate the glucose that is circulating in the bloodstream. If the condition is left undiagnosed and untreated, it can progress to severe illness and possibly death. However, diabetes mellitus sometimes can be reversible when noted in the intact female dog.

Although there are two types of diabetes mellitus in dogs, insulin-dependent and non-insulin-dependent, the latter occurs rarely. This discussion is limited to insulin-dependent diabetes mellitus, IDDM. Just like humans with IDDM, dogs affected by this form of the disease will require lifelong administration of insulin in order to keep their blood glucose levels under control.

Some dogs accept and respond to treatment successfully. Others will not respond with even the most aggressive treatment, especially if multiple disorders are present.

**Diagnosis:**

The presence of the classic signs of diabetes usually prompts laboratory testing. The key diagnostic clues are high levels of glucose in the blood and in the urine. A more advanced and critical stage of diabetes is sometimes denoted by the presence of ketones in the urine. This complicated form of diabetes is called diabetic ketoacidosis.

The examining veterinarian may run tests, including a CBC, or complete blood count, a serum biochemical profile, and a urinalysis to rule out the possibility of other diseases that may cause signs similar to those seen in diabetes. In some cases, the initial test results may indicate the need to do more specific tests.

The veterinarian also may schedule in-hospital stays for the dog to allow for serial blood glucose checks every one to two hours over a 12 to 24 hour period. This series of tests is called a blood glucose curve, and ideally will provide information about the effectiveness of the insulin doses and how long each remains active. Depending upon the results of the tests, the examining veterinarian will adjust the insulin type, dose, and frequency of administration so that the dog's blood glucose level remains within a close-to-normal range over a 24-hour period.

**Prognosis:**

The prognosis is dependent on a number of factors. Whether the dog recovers will depend upon the owner's willingness to treat the disease, the dog's ability to respond to the insulin, the dog's age at the onset of disease, the presence of concurrent disorders, and the development of complications of diabetes. With dedicated care from the owner, recheck appointments with the veterinarian, and a teamwork approach between the owner and the doctor, many diabetic dogs can live healthy lives for several years. For

those pets that fail to respond to therapy, or whose owners decline treatment, a shortened life span is expected.

#### **Transmission or Cause:**

The cause of diabetes is believed to be multifactorial. Causes to consider include genetic predisposition, infection, drugs, pancreatic disease, obesity, estrus in intact females, and concurrent illness.

#### **Treatment:**

The goals of treatment are to return the dog to normal health and to prevent complications that can arise from a high blood glucose level. Some possible complications include infections of the urinary tract, respiratory system, and skin; ketoacidosis or severe metabolic disturbance; cataracts which result in vision loss; pancreatitis or inflammation of the pancreas; and other less common disorders. Treatment protocols include proper insulin administration, diet and exercise plans, and control of concurrent disease. Intact female patients need to be spayed as soon as their diabetes is stable to prevent disruption of diabetic control due to fluctuating reproductive hormones. Also, some unspayed diabetic dogs will have complete resolution of their diabetes after an ovariohysterectomy.

The examining veterinarian will choose an appropriate type of insulin for the dog. The most common insulin preparations are derived from a combination of beef and pork, from purified pork, and from recombinant human insulin. Many doctors now use this last form since it is readily available. Insulin types include regular crystalline, NPH, PZI, Lente, and Ultralente. The specific unit dose of insulin the veterinarian selects will be based on several factors, including body weight and type of insulin. The goal is not to achieve perfect control from the onset, but rather to allow the dog and owner to get used to the new routine of insulin injections and dietary changes.

The dog usually is rechecked weekly. It is common for the veterinarian to make adjustments in the insulin protocol during these visits. Insulin doses should not be adjusted at home unless the veterinarian has instructed the change. Blood glucose curves and other tests are required throughout treatment to accurately assess the animal's response to treatment. Some dogs can become regulated with relative ease if they respond well to therapy. Other dogs can take much longer, or never respond, especially if they have a concurrent disease. A "honeymoon period" is noted in some dogs in which they appear to respond initially to the insulin but then lose control within the first six months of therapy.

Close monitoring of the dog's water consumption and urination will alert the owner to problems with diabetic control; the veterinarian should be notified if symptoms fail to improve or if they return. Success of control is defined by the resolution of symptoms including excessive thirst, excessive urination, stability of body weight, normal behavior, and a normal blood glucose range noted in the blood tests.

Many diabetic dogs are overweight. For optimal glucose control, obesity should be corrected slowly in diabetic patients; it should take several months for the dog to reach

the ideal weight recommended by the veterinarian. In addition, the veterinarian may suggest a specific diet type. Commercial diets containing higher amounts of fiber and digestible complex carbohydrates usually are advised for diabetic animals because they help decrease the fluctuations in blood glucose levels after a meal is consumed. The total daily caloric intake should be divided into multiple meals and given within the time frame of insulin action.

Exercise is highly encouraged due to its beneficial effects on blood glucose control and weight loss. If the dog has not had a structured routine, then it is recommended to start with short walks and slowly increase to a tolerable level.

**Prevention:**

It may not be possible to prevent diabetes mellitus. However, maintaining a dog's ideal weight and initiating regular exercise into its routine may be beneficial. Owners also should pay close attention to the dog's drinking, eating, and elimination habits. If any abnormalities are noted, the owner should seek veterinary care. Early detection may lead to easier control or, at least, avoidance of severe disease complications.