

# UNCOMPLICATED DIABETES MELLITUS IN CATS

## BASICS

### OVERVIEW

- Disorder of carbohydrate, fat, and protein metabolism caused by absolute or relative insulin deficiency
- Type II (non-insulin-dependent diabetes mellitus) is characterized by inadequate or delayed insulin secretion relative to the needs of the patient; many of these patients live without the need for insulin injections (exogenous insulin) and are less prone to ketoacidosis (acidic condition of the blood caused by the presence of ketone bodies); most common form in cats
- “Uncomplicated” diabetes mellitus is a designation that indicates the cat has diabetes mellitus, but does not have secondary problems (such as ketoacidosis, vomiting, or diarrhea) that makes the cat “more sick” and requires more aggressive treatment

### GENETICS

- Genetic susceptibility

### SIGNALMENT/DESCRIPTION of ANIMAL

#### *Species*

- Cats

#### *Breed Predispositions*

- None

#### *Mean Age and Range*

- 75% are 8 to 13 years of age; range, 1 to 19 years of age

#### *Predominant Sex*

- Male

### SIGNS/OBSERVED CHANGES in the ANIMAL

- Early signs—obesity with recent weight loss is typical
- Muscle wasting along the back and an oily coat with dandruff are common
- Enlarged liver (known as “hepatomegaly”); yellowish discoloration to skin and moist tissues (mucous membranes) of the body (icterus or jaundice) more common
- Less common findings—a plantigrade stance (in which the lower part of the rear legs is dropped toward the ground so it looks like the cat is standing or walking on its lower leg and paw or is in a somewhat crouched position; caused by a nervous system disorder related to the diabetes, known as “diabetic neuropathy”)
- Later signs—excessive urination (polyuria) and excessive thirst (polydipsia), excessive appetite (polyphagia), and weight loss, loss of appetite (anorexia), sluggishness (lethargy), depression, and vomiting

### CAUSES

- Genetic susceptibility
- Amyloid (insoluble proteins deposited outside of the cells in various tissues and organs, compromising their normal function)
- Inflammation of the pancreas (pancreatitis); the pancreas is the organ that normally produces and releases insulin
- Predisposing diseases (such as hyperadrenocorticism or Cushing’s disease [where the adrenal glands produce excessive amounts of steroids] and acromegaly [where the body produces excessive amounts of somatotropin, a growth hormone, leading to enlargement of the head, limbs, and organs])
- Drugs (such as steroids and progestogens)

### RISK FACTORS

- Obesity for type II diabetes mellitus

## TREATMENT

### HEALTH CARE

- Cats that have compensated for their diabetes (that is, the cat appears to be “healthy” and is alert, eating and drinking, with no signs of vomiting) can be managed as outpatients

### ACTIVITY

- Strenuous activity may lower insulin requirement; a consistent amount of activity each day is helpful

### DIET

- Avoid soft, moist foods because they cause severe increases in blood glucose (hyperglycemia) following the meal (known as “postprandial elevations in blood glucose”)

- Thin cats or non-obese cats—feed a high-protein, low-carbohydrate diet that the pet will eat reliably; keep daily caloric intake constant; avoid reduced-calorie diet; starvation worsens ketoacidosis (acidic condition of the blood caused by the presence of ketone bodies) and may lead to poor immune function
- Obese cats—gradual weight reduction improves insulin sensitivity and reverses diabetes in some cats with type II diabetes mellitus; feed a high-protein, low-carbohydrate diet
- Special considerations for feline diabetics: cats evolved as obligate carnivores (they must have meat in their diet) with metabolic pathways adapted for efficient utilization of protein, but not well suited for large-carbohydrate loads; preliminary studies suggest that low-carbohydrate canned diets may lower insulin requirements in diabetic cats; most dry pet food is manufactured with a higher carbohydrate content than the equivalent wet form, and simply switching from dry to wet food may reduce percentage of body fat and improve control of blood glucose levels (known as “glycemic control”) in obese, diabetic cats; any change in diet should be under the supervision of your pet’s veterinarian; monitor closely for change in insulin requirement following any adjustment in diet

### **SURGERY**

- Intact females should be spayed (ovariohysterectomy) when stable; progesterone (a female hormone) secretion makes management of diabetes mellitus difficult

### **MEDICATIONS**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Insulin—treatment of choice for most cats
- Pork lente insulin (Vetsulin™, U-40)—intermediate duration of effect; given subcutaneously (under the skin)
- Protamine zinc insulin (PZI, U-40)—long-acting insulin; given subcutaneously
- Glargine insulin (Lantus®, U-100)—human recombinant insulin; gives best results when combined with a high-protein, low-carbohydrate, diet—remission rates of 70% to 100% reported with this combination
- Species of origin of the insulin may affect how the drug is absorbed and used in the body (known as “pharmacokinetics”); beef, beef/pork, human recombinant insulin are options; beef preferred for cats
- Oral drugs to decrease blood glucose (known as “hypoglycemic agents”)—glipizide is useful with dietary therapy in cats with type II diabetes mellitus; the cat should have uncomplicated diabetes mellitus (“uncomplicated” diabetes mellitus is a designation that indicates the cat does not have secondary problems [such as ketoacidosis, vomiting, or diarrhea] that makes the cat “more sick” and requires more aggressive treatment) and no history of ketoacidosis (acidic condition of the blood caused by the presence of ketone bodies)
- Acarbose

### **FOLLOW-UP CARE**

#### **PATIENT MONITORING**

- Glucose curve—not helpful in cats
- Urinary glucose monitoring—urine is tested for glucose and ketones before the meal and insulin injection; to use this as a regulatory method, the pet must be allowed to have trace to 1/4% glucose in the urine (glucosuria) to avoid the development of too low a level of glucose in the blood (hypoglycemia)
- Fructosamine (a particular protein found in blood used to monitor control of blood glucose levels [glycemic control])—maintain at less than 400 micromol/L; recheck every four weeks during initial regulation of insulin treatment and then every three months
- Clinical signs—owner can assess degree of excessive urination (polyuria) and excessive thirst (polydipsia), appetite, and body weight; if these are normal, the disease is well regulated or controlled

#### **PREVENTIONS AND AVOIDANCE**

- Prevent or correct obesity
- Avoid unnecessary treatment with steroids or megestrol acetate

#### **POSSIBLE COMPLICATIONS**

- Seizure or coma with insulin overdose
- Low red blood-cell count (anemia) and the presence of hemoglobin in the blood (hemoglobinemia) with severely low levels of phosphorus in the blood (hypophosphatemia), which can occur after initial insulin therapy
- Nerve damage related to diabetes mellitus (diabetic neuropathy)

#### **EXPECTED COURSE AND PROGNOSIS**

- Some cats recover, but may relapse at a later time
- Prognosis with treatment is good; most animals have normal life spans

## KEY POINTS

- Daily feeding and medication schedules are necessary to maintain blood glucose in normal range
- If the cat develops signs of weakness, sluggishness, or seizures (possible signs of low blood sugar [hypoglycemia]) call your pet's veterinarian immediately
- Keep a chart of pertinent information about the pet, such as urine dipstick results, daily insulin dose, and weekly body weight

