



# Insulinoma

(Tumor Involving Cells of the Pancreas that Secrete the Hormone Insulin)

## Basics

### OVERVIEW

- Pancreatic islet  $\beta$ -cell tumor that secretes an excess quantity of insulin, independent of glucose (sugar) levels in the blood, leading to low levels of glucose in the blood (known as “hypoglycemia”)
- The  $\beta$ -cells of the pancreas produce insulin, the hormone that regulates blood glucose (sugar) levels; under normal conditions, insulin responds to changes in blood glucose levels and keeps the blood glucose in a relatively narrow range—if the blood glucose levels increase over a certain level (generally around 110 mg/dl), insulin levels increase to push the blood glucose level down; if blood glucose levels fall below a certain level (generally about 60 mg/dl), insulin levels drop to allow the blood glucose to go up

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs—uncommon
- Cats—rare
- Ferrets—common

#### Breed Predilections

- Dogs—Labrador retriever, standard poodle, boxer, fox terrier, Irish setter, German shepherd dog, golden retriever, and collie
- Cats—none; possibly Siamese

#### Mean Age and Range

- Dogs—middle-aged to old; mean, 10 years of age; range, 3–14 years of age
- Cats—mean, 15 years of age; range, 12–17 years of age
- Ferrets—mean, 5 years of age; range, 2–7 years of age

### SIGNS/OBSERVED CHANGES IN THE PET

- Often episodic
- Signs may or may not be related to fasting, excitement, exercise, and/or eating
- Dogs generally demonstrate more than one clinical sign, and signs progress with time

- Dogs—seizures (generalized and/or focal) are most common; also, weakness; partial paralysis of the hindquarters; collapse; involuntary muscle twitches (known as “muscle fasciculations”); bizarre behavior; sluggishness (lethargy) and depression; wobbly gait (known as “ataxia”); increased appetite (known as “polyphagia”); weight gain; increased urination (known as “polyuria”) and increased thirst (known as “polydipsia”); and exercise intolerance
- Cats—seizures; wobbly gait (ataxia); involuntary muscle twitches (muscle fasciculations); weakness; sluggishness (lethargy) and depression; lack of appetite (known as “anorexia”); weight loss; and increased thirst (polydipsia)
- Physical examination usually normal
- Obesity in common
- Ferrets may have weakness; collapse; difficulty rousing from sleep; drooling (known as “ptyalism”); and rarely seizures

## CAUSES

- Most dog and cat patients have single, insulin-producing  $\beta$ -islet cell cancer (known as a “carcinoma” or “adenocarcinoma”) of the pancreas
- Ferrets generally have multiple insulin-producing  $\beta$ -islet cell tumors

## RISK FACTORS

- Fasting significantly may increase the risk of low blood sugar (hypoglycemia); behavior or signs related to low blood sugar are called “hypoglycemic episodes”; additional risk factors for the development of hypoglycemic episodes include excitement, exercise, and eating

# Treatment

## HEALTH CARE

- Hospitalize for diagnostic workup and surgery, since life-threatening low blood sugar (hypoglycemia) is a very real possibility
- Treatment may be performed on an outpatient basis, if the owner declines surgery, and if the pet does not have signs of low blood sugar (hypoglycemia)
- For emergency low blood sugar (hypoglycemic) episodes, administer 50% dextrose into a vein (known as “intravascular” or IV administration) to control seizures and/or severe signs of low blood sugar
- Fluid therapy with 2.5% dextrose (increase to 5%, if needed to control clinical signs) should follow dextrose bolus; alternatively, if the pet can eat, frequent feedings of an appropriate diet may replace need for dextrose-containing fluids

## ACTIVITY

- Restricted

## DIET

- Feed four to six small meals a day
- Food should be high in protein, fat, and complex carbohydrates and low in simple sugars
- Avoid semimoist foods, which dilute the levels of protein, fat, and complex carbohydrates

## SURGERY

- Exploratory surgery of the abdomen allows surgical removal of all or part of the pancreatic islet  $\beta$ -cell tumor and identification of possible metastatic tumors to other organs (such as to the liver); laboratory testing (known as “histopathology”) confirms diagnosis

# 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

## LONG-TERM THERAPY

- Steroids (such as prednisone)—initial medical treatment if diet alone is ineffective; begin with low dosage and

gradually increase as signs of low blood sugar (hypoglycemia) recur

- Diazoxide (Proglycem)—added after diet and steroids have proven ineffective
- Streptozocin—a nitrosourea that selectively kills pancreatic  $\beta$ -cells; administer with drugs to decrease vomiting (known as “antiemetics”), a side effect of the drug
- Glucagon—a gluconeogenic drug used to treat sudden low blood sugar that is poorly responsive to medical treatment
- Sandostatin (ocreotide or lantreotide)—a synthetic somatostatin analogue; prevents low blood sugar (hypoglycemia) in some dogs that are poorly responsive to conventional treatment; can be used with diet, steroids, and diazoxide; expensive

## Follow-Up Care

### PATIENT MONITORING

- At home: monitor for return or progression of clinical signs of low blood sugar (hypoglycemia)
- In-hospital blood glucose determinations—single, intermittent blood glucose determinations may not truly reflect control of blood sugar levels (known as “glycemic control”) of the pet because insulinomas occasionally respond to changing blood sugar levels
- Adjust medication on the basis of clinical signs and blood glucose (sugar) levels

### POSSIBLE COMPLICATIONS

- Recurrent or progressive episodes of low blood sugar (hypoglycemia)

### EXPECTED COURSE AND PROGNOSIS

- Dogs that undergo surgery (exploratory laparotomy) are more likely to achieve and maintain normal blood glucose levels (known as being “euglycemic”) longer and have longer survival times than dogs managed only by medical treatment; median survival time for dogs without evidence of spread of the cancer (known as “metastasis”) is about 16–19 months and for dogs with evidence of metastasis is about 7–9 months
- Cats—mean survival time, about 6.5 months; range, 0–18 months

## Key Points

- Be aware of signs of low blood sugar (hypoglycemia) and seek immediate veterinary medical attention if they occur
- Feed four to six small meals a day
- Food should be high in protein, fat, and complex carbohydrates and low in simple sugars

# Notes

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