INSULINOMA
(TUMOR INVOLVING CELLS OF THE PANCREAS THAT SECRETE THE HORMONE, INSULIN)

BASICS

OVERVIEW
- Pancreatic islet β-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 β-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 ANIMAL

Species
- Dogs—uncommon
- Cats—rare (4 reports)

Breed Predilections
- Dogs—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, 10.5 years of age; range, 3 to 14 years of age (rare in dogs less than 6 years of age)
- Cats—(4 cases); mean, 14.75 years of age; range, 12 to 17 years of age

SIGNS/OBSERVED CHANGES in the ANIMAL
- Episodic
- Signs may or may not be related to fasting, excitement, exercise, and eating
- Dogs usually demonstrate more than one clinical sign, and signs progress with time
- Dogs—seizures (generalized and focal) most common; also, partial paralysis of the hindquarters; weakness; collapse; involuntary muscle twitches; abnormal 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; weakness; sluggishness (lethargy) and depression; lack of appetite (known as "anorexia"); weight loss; and increased thirst (polydipsia)
- Physical examination usually normal
- Obesity in some dogs
- Rarely, nervous system disease involving several nerves (known as "polyneuropathy") in dogs

CAUSES
- Most patients have malignant, insulin-producing cancer (known as a "carcinoma" or "adenocarcinoma") of the pancreas; tumors that appear to be benign on microscopic sections usually metastasize later

RISK FACTORS
- Fasting, excitement, exercise, and eating may increase the risk of low blood sugar; behavior or signs related to low blood sugar are called "hypoglycemic episodes"

TREATMENT

HEALTH CARE
- Hospitalize for diagnostic workup and surgery, as well as for treatment of low blood sugar (hypoglycemia), if needed
- Treat as outpatient if the owner declines surgery, and if the patient does not have signs of low blood sugar (hypoglycemia)
- Administer 50% dextrose 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 patient can eat, frequent feedings of an appropriate diet may replace need for dextrose-containing fluids

ACTIVITY
- Restricted

DIET

- The first and most important aspect of management (with or without surgery)
- Feed 4 to 6 small meals a day
- Should be high in protein, fat, and complex carbohydrates and low in simple sugars; avoid semi-moist food

SURGERY

- Surgical removal of all or part of the pancreatic islet β-cell tumor confirms diagnosis, may improve survival time, potentially can provide prolonged remission, and may improve response to medical treatment; postoperative inflammation of the pancreas (known as "pancreatitis") is possible

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 β-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 patient because insulinomas occasionally respond to changing blood sugar levels
- Adjust medication on the basis of clinical signs and blood sugar levels and fructosamine (a particular protein found in blood used to monitor glycemic control) concentrations

POSSIBLE COMPLICATIONS

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

EXPECTED COURSE AND PROGNOSIS

- Likelihood of malignancy is high; metastasis is seen in 40% of patients at the time of surgery
- Dogs—mean survival time, about 16 to 19 months; range, 2 to 60 months; surgery improves survival time in some animals
- Cats—mean survival time, about 6.5 months; range, 0 to 18 months

KEY POINTS

- Be aware of signs of low blood sugar (hypoglycemia) and seek immediate veterinary medical attention if they occur
- Diet is the first and most important aspect of management (with or without surgery)
- Likelihood of malignancy is high; metastasis is seen in 40% of patients at the time of surgery