



# Exocrine Pancreatic Insufficiency

## Basics

### OVERVIEW

- The pancreas is an organ of the body, located near the upper small intestine; the pancreas produces insulin to regulate blood sugar and produces digestive enzymes involved in digestion of starches, fats, and proteins in the pet's diet; the digestive enzymes are delivered to the upper small intestine through the pancreatic duct
- Pancreatic acinar cells produce the digestive enzymes
- “Exocrine” refers to an organ or gland that secretes its products through a duct; “pancreatic” refers to the pancreas; “insufficiency” is defined as being inadequate
- Exocrine pancreatic insufficiency is a syndrome caused by inadequate amounts of pancreatic digestive enzymes in the small intestinal tract; most commonly due to insufficient production and secretion of digestive enzymes by the exocrine pancreas
- Also known as EPI

### GENETICS

- Assumed to be hereditary in the German shepherd dog and probably a complex trait

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs
- Cats—less common

#### Breed Predispositions

- German shepherd dogs, rough-coated collies, and Eurasians (Eurasier)

#### Mean Age and Range

- Young German shepherd dogs (age range approximately 1–4 years) with chronic diarrhea
- Wasting away or decrease in size of the cells in the pancreas that produce the digestive enzymes (known as “pancreatic acinar atrophy”) in young dogs
- Long-term (chronic) inflammation of the pancreas (known as “pancreatitis”) in dogs and cats of any age, but more common in middle-aged to older pets

### SIGNS/OBSERVED CHANGES IN THE PET

- Severity—varies
- Weight loss with a normal to increased appetite; thin body
- Long-term (chronic) loose stool or diarrhea
- Diarrhea—often resembles cow feces; diarrhea may be continuous or intermittent
- Stool volumes larger than normal, with the presence of large amounts of fat in the stool, due to the inability to digest fat (known as “steatorrhea”)
- Excessive gas formation in the stomach or intestines (known as “flatulence”) and rumbling or gurgling sounds

- caused by movement of gas in the intestinal tract (known as “borborygmus”) are common, especially in dogs
- May eat feces or bowel movement (known as “coprophagia”) and/or eat nonfood items (known as “pica”)
  - May be accompanied by increased urination (known as “polyuria”) and increased thirst (known as “polydipsia”), if pet also has co-existent diabetes mellitus (“sugar diabetes”) as a complication from long-term (chronic) inflammation of the pancreas (pancreatitis)
  - Decreased muscle mass
  - Poor-quality hair coat
  - Cats with large amounts of fat in the stool, due to the inability to digest fat (steatorrhea) may have greasy “soiling” of the hair coat around the area of the anus (known as the “perineal area”)

## CAUSES

- Wasting away or decrease in size of the cells in the pancreas that produce the digestive enzymes (pancreatic acinar atrophy)
- Long-term (chronic) inflammation of the pancreas (pancreatitis)
- Cancer of the pancreas (known as “pancreatic adenocarcinoma”), leading to blockage of the pancreatic duct
- Parasite—pancreatic fluke (*Eurytrema procyonis*) infestation in cats

## RISK FACTORS

- Breed—German shepherd dogs, rough-coated collies, and Eurasians (Eurasier)
- Any condition increasing the likelihood of developing long-term (chronic) inflammation of the pancreas (pancreatitis) in dogs or cats

## Treatment

### HEALTH CARE

- Outpatient medical management
- Pets with co-existent diabetes mellitus initially may require hospitalization for insulin regulation of high blood sugar (known as “hyperglycemia”)

### DIET

- Supplementation of the diet with pancreatic enzyme replacement is the mainstay of treatment
- Type of diet does not play a role in the management of exocrine pancreatic insufficiency in dogs and cats; however, low-fat and high-fiber diets should be avoided
- Approximately 40% of all dogs with EPI and virtually all cats with EPI are cobalamin (vitamin B12) deficient and require cobalamin supplementation
- Severely malnourished dogs also may require supplementation with tocopherol (vitamin E), and fat-soluble vitamins

## 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

- Powdered (non-enteric coated) pancreatic enzymes are the treatment of choice
- Initially—mix pancreatic enzyme powder in food at a dosage prescribed by your pet's veterinarian with each meal; feed two meals daily to promote weight gain
- Allowing the pancreatic enzyme powder to “work” on the food several minutes prior to feeding (known as “preincubation”) does *not* improve the effectiveness of treatment
- Cobalamin (vitamin B12) supplementation is crucial, if the pet is cobalamin deficient
- Administration of antacids (such as famotidine, ranitidine, or omeprazole) may improve the condition in pets that do not respond to pancreatic enzyme treatment
- Most dogs respond to pancreatic enzyme treatment within 5–7 days; after a complete response has been achieved, the amount of the pancreatic enzyme supplement gradually may be reduced to a dose that prevents return of clinical signs
- Antibiotic therapy (tylosin) administered by mouth may be required for 4–6 weeks in dogs with co-existent small intestinal bacterial overgrowth (SIBO), a condition in which a high number of bacteria are found in the

upper small intestine; however, SIBO resolves spontaneously in most dogs upon commencement of pancreatic enzyme replacement therapy

- The cost of pancreatic enzyme replacement is very high; some cats refuse to consume the pancreatic enzyme supplement—these pets often can be managed successfully by administration of raw beef, pork, or game pancreas; your pet's veterinarian can provide information regarding amount to be fed (raw pancreas can be kept frozen for months without losing enzymatic activity)

## **Follow-Up Care**

### **PATIENT MONITORING**

- Weekly for first month of therapy
- Diarrhea improves markedly—stool consistency typically normalizes within 1 week of starting pancreatic enzyme replacement treatment
- Monitor body weight; should gain weight with treatment
- Dogs that fail to respond after 1 week of pancreatic enzyme replacement treatment should be placed on antibiotics for co-existent small intestinal bacterial overgrowth; a condition in which a high number of bacteria are found in the upper small intestine
- Once body weight and conditioning normalize, gradually reduce the daily dosage of enzyme supplements to a level that maintains normal body weight
- Recheck serum cobalamin (vitamin B12) concentration a month after the last dose of cobalamin

### **PREVENTIONS AND AVOIDANCE**

- Do not breed pets with wasting away or decrease in size of the cells in the pancreas that produce the digestive enzymes (pancreatic acinar atrophy)

### **POSSIBLE COMPLICATIONS**

- Approximately 20% of dogs fail to respond to pancreatic enzymes and need further treatment
- Most pets with exocrine pancreatic insufficiency have cobalamin (vitamin B12) deficiency and need to be managed accordingly
- Some dogs treated with pancreatic enzyme supplements develop ulcers in their mouths; in most of these dogs, the dose of pancreatic enzyme supplements can be decreased, while maintaining therapeutic response

### **EXPECTED COURSE AND PROGNOSIS**

- Most causes are irreversible, and lifelong treatment will be required
- Dogs with exocrine pancreatic insufficiency alone have a good prognosis with appropriate pancreatic enzyme supplementation and supportive management
- Prognosis is more guarded in pets with co-existent EPI and diabetes mellitus due to long-term (chronic) inflammation of the pancreas (pancreatitis)

## **Key Points**

- Exocrine pancreatic insufficiency probably is inherited in German shepherd dogs; affected dogs should not be used for breeding
- Pancreatic enzyme supplements are expensive and the pet will need lifelong treatment in most cases
- Co-existent diabetes mellitus is possible in pets with long-term (chronic) inflammation of the pancreas (pancreatitis)

# Notes

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