

Exocrine Pancreatic Insufficiency – Canine

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Definition

Exocrine pancreatic insufficiency (EPI) is a reduction in pancreatic acinar synthesis and secretion of digestive enzymes, including lipases, amylase, trypsin, and proteases, that results in retardation of normal intestinal digestion of fats, carbohydrates, protein and vitamins.

Key Diagnostic Tools and Measures

Trypsin-like immunoreactivity (TLI) measures the fasted level of serum trypsinogen (and active trypsin) and reflects exocrine pancreatic function. Fecal elastase and pancreatic histopathology obtained via laparoscopic or surgical biopsy can be useful adjunct tests for EPI. Common comorbidities with EPI are mentioned elsewhere.

Pathophysiology

Genetically based immune-mediated pancreatic acinar destruction precedes development of EPI in certain breeds.³ EPI can also occur secondary to chronic pancreatitis.² With either etiology the reduction in pancreatic exocrine function results in fewer enzymes being available to digest intestinal contents. Maldigestion of nutrients results in malnutrition, diarrhea, intestinal mucosal irritation, bacterial overgrowth, and toxin absorption. Subclinical reductions in digestive function precede the onset of characteristic clinical signs.

Signalment

German shepherd dogs and rough-coated collies comprise almost 90% of all canine EPI cases in the United States.¹ These breeds often develop the condition as young dogs secondary to immune-mediated pancreatic acinar destruction. Other breeds can develop EPI subsequent to chronic pancreatitis at any age.

Key Nutrient Modifications

Various nutrient modifications can be useful in individual dogs with EPI. Some dogs, particularly those that develop EPI secondary to chronic pancreatitis, may benefit from feeding a diet that is low in fat. The level of fat restriction should be considered relative to the previous intake ascertained from the diet history. Other dogs may benefit from feeding a higher-fat (more calorie dense) diet, highly digestible (low-fiber) diet, or a high-fiber diet. Many dogs may be well managed while remaining on their regular diet when supplemented with pancreatic enzymes. Regardless of which diet approach is used, it is important to feed a complete and balanced diet. Because of the variety of diets that may be acceptable to dogs with EPI, concurrent conditions may take priority in diet selection initially although modification may be required if significant undesirable signs are noted.

Recommended Ranges of Key Nutrients

Nutrient	% DM	g/100 kcal	% DM	g/100 kcal
	Recommended dietary level		Minimum dietary requirement*	
Fat	7–15	3–5	5	1.4

Modified intake of these nutrients may help address metabolic alterations induced by disease states. The recommended dietary composition is shown as percent of dietary dry matter (DM) and as g or mg per 100 kcal metabolizable energy (ME). All other essential nutrients should meet normal requirements adjusted for life stage, lifestyle, and energy intake.

*Nutrient requirement for adult animals as determined by the Association of American Feed Control Officials

Diets for dogs with pancreatitis often contain less fat. Not all dogs with pancreatitis need this level of fat restriction and factors other than fat content (such as digestibility, protein content) may be important for dogs with pancreatitis.

Therapeutic Feeding Principles

Some resources recommend feeding a highly digestible fat-restricted diet to dogs with EPI to reduce flatulence and fecal volume, but many animals can be maintained on a variety of diets with appropriate digestive enzyme supplementation. In fact, recent studies have shown no significant benefit with feeding a highly digestible fat-restricted diet to dogs with EPI. Unnecessarily restricting the fat content of the diet will reduce the caloric density of the diet requiring the animal to ingest a larger volume of food in order to consume adequate calories to arrest further weight loss. A recent small study found that 40% of dogs with EPI were best controlled when maintained on their regular diet, 25% were best controlled on a high-fat diet, 20% were best controlled on a high-fiber diet and 10% were best controlled on a highly digestible diet.⁴ Recognizing that individual dogs with EPI respond differently to various feeding regimes, but all dogs likely benefit from consistency in the diet fed, will allow the clinician to individually formulate appropriate feeding strategies. Supplementation of the diet with parenteral vitamin B12 should be considered in deficient animals.

■ **Treats** – As dogs with EPI require supplementation of digestive enzymes with any food, and individual animals may respond undesirably to certain nutrients such as fat and fiber, treats are not generally recommended. If treats are given, they should be incorporated slowly, consistency maintained in type of treat, and the dog monitored closely for adverse effects. As always, it is suggested that all treats and supplements supply less than 10% of the total daily calories.

■ **Tips for Increasing Palatability** – The majority of dogs with EPI maintain an excellent appetite. If a particular commercial preparation is not accepted, the dog may find other suitable diets tempting. Alternatively, warming the food to body temperature or adding a sweetener such as corn syrup may increase palatability. Appetite stimulants or assisted-feeding devices are occasionally necessary in patients where persistent anorexia precludes necessary caloric intake.

■ **Diet Recommendations** – Many of the intestinal-disease type diets from the veterinary therapeutic diet manufacturers are considered to be highly digestible, but they have markedly variable fat contents. Clinicians should check the fat content of diets (ideally on a ME basis) with the manufacturers to ensure that they are appropriate for fat-intolerant animals. Some dogs with EPI may have improved clinical signs when fed a higher-fat diet, a high-fiber diet, or their regular diet.

Client Education Points

- EPI is a common disease in dogs whereby the pancreas fails to produce the products necessary for normal digestion of food.
- Diagnosis is often suggested on the basis of breed, age, and signs, but confirmatory laboratory testing is required.
- Clinical signs commonly seen in dogs with EPI including weight loss despite appropriate daily caloric intake, diarrhea, and a poor haircoat.
- These signs can often be alleviated with appropriate therapy.
- Animals diagnosed with EPI require life-long management, but can achieve extended survival times (median survival time >5 years in a recent study) particularly if they achieve a rapid initial response.
- Feeding of a consistent diet and supplementation of the diet with digestive enzymes are generally recommended.

- Various diet types can be effective for individual dogs so a few separate diet trials may be suggested.
- A number of secondary conditions can complicate management and are frequently checked for to ensure optimal control of clinical signs associated with EPI.
- Often rapid response to treatment can be seen, but some animals respond poorly to even the most complete treatment plans.

Common Comorbidities

Measurement of serum cobalamin and folate may be useful to assess for concurrent vitamin B12 malnutrition or intestinal bacterial overgrowth. Both of these conditions occur commonly in dogs with EPI and may have clinically relevant effects. Parenteral administration of vitamin B12 every 1 to 4 weeks may be used in dogs found to be deficient, as oral supplementation is unlikely to be beneficial in animals with deranged intestinal handling of this vitamin. Dogs with intestinal flora alterations secondary to maldigestion of nutrients may benefit from treatment with an antibiotic such as tylosin or a probiotic supplement. It may also be useful to routinely assess breeds other than those known to have a genetic basis for developing EPI for evidence of underlying pancreatitis and concurrent diabetes mellitus.

Interacting Medical Management Strategies

Supplementation of the diet with digestive enzymes, as powder, raw pancreas, or tablets/capsules, prior to consumption is essential in ensuring effective management of EPI. Inadequate digestive enzyme supplementation is a common cause of treatment failure. Powdered supplements are considered by some clinicians to be more effective in some dogs. Much of the supplemented enzyme is digested in the stomach so sufficient amounts must be supplied to overcome this anticipated loss. Some animals may benefit from concurrent administration of H-2 antagonists such as famotidine to reduce gastric acidity.

Monitoring

Primary clinical markers indicating attainment of a desired therapeutic effect are resolution of diarrhea, maintenance of or increase in body weight, and improvement in haircoat. It may also be beneficial to monitor serum cobalamin, folate, and pancreatic lipase immunoreactivity (PLI) concentrations depending on the results of initial testing. Animals that respond poorly to appropriate diets, supplementation, and medication should be evaluated for intestinal neoplasia, intestinal inflammation, or adverse reactions to food.

Algorithm – Nutritional Management of Canine Exocrine Pancreatic Insufficiency

