

Exocrine Pancreatic Insufficiency in Dogs and Cats



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What the Pancreas Normally Does

The pancreas is a small, light pink glandular organ nestled under the stomach and alongside the duodenum (upper small intestine). The "endocrine" part of the pancreas secretes hormones involved in blood sugar regulation, such as insulin and glucagon. The "exocrine" pancreas produces enzymes we use to digest our food. These two parts of the pancreas are not in separate areas but instead these two different types of pancreatic tissues are all mixed together throughout the entire pancreas.

Digestive enzymes include amylase to digest starches, lipases to digest fats, and trypsin and proteases to digest protein. They are stored in inactive forms inside specific granules in the exocrine pancreatic tissue (the acinar cells) awaiting the chemical signal for their secretion. When food has been sufficiently ground up by the stomach, it is released downstream into the duodenum. When this food is perceived in the duodenum, the awaited chemical signal stimulates the pancreas to send its enzymes down the pancreatic duct and into the duodenum so as to continue the digestive process.

Once nutrients are broken down into smaller molecules (digested), they can be absorbed down the entire length of the GI tract.

Without an adequate amount of enzymes, we cannot break down/digest our food. If we cannot digest the food, we cannot absorb the food. We get skinny, have especially nasty rather greasy diarrhea, or both. Often, pets will develop a dry, dandruffy coat from their inability to absorb dietary fats and can be anemic from a vitamin B12 deficiency. Difficulty in clotting blood (vitamin K-related coagulopathy) can result as well.

Exocrine Pancreatic Insufficiency (also called Maldigestion)

The most common cause of digestive enzyme deficiency in dogs is pancreatic acinar atrophy, where the pancreas simply becomes shriveled and useless. This condition seems to have a genetic

basis but is not congenital and may develop at any age although it usually shows up before age 4 years. The German Shepherd Dog and Rough-Coated Collie are particularly at risk and the mode of inheritance appears to be autosomal recessive (meaning genetic carriers will appear normal). About 70% of dogs with exocrine

pancreatic insufficiency are German Shepherd dogs and 20% are Rough Collies. Recently a juvenile onset form of exocrine pancreatic insufficiency has been described in Greyhounds, however, because this breed is primarily used in racing, sickly puppies are commonly euthanized, thus keeping the condition from being recognized in the pet population.

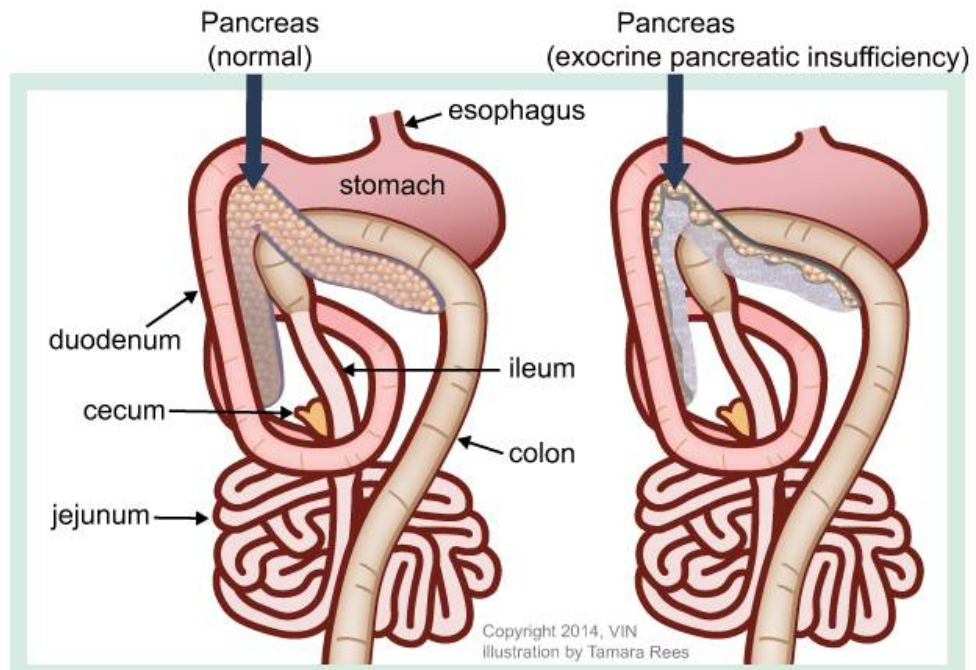
Dogs can also develop exocrine pancreatic insufficiency after chronic pancreatitis has destroyed over 90% of the functioning acinar glands. When a dog develops pancreatic insufficiency after age 5 years, there is usually an underlying pancreatitis. Cancer of the pancreas can also lead to pancreatic exocrine insufficiency though this is a rare cause, as is congenital pancreatic atrophy.

In cats, chronic pancreatitis is the usual cause of exocrine pancreatic insufficiency. There does not appear to be a genetic concern; though, rarely, cats that eat grasshoppers may get infected with a pancreatic fluke carried by grasshoppers (*Eurytrema procyonis*). This fluke, similar to a very small worm, can cause enough inflammation to cause pancreatitis or enough general pancreatic damage to cause exocrine insufficiency.

Diagnosis Requires Specific Tests

Trypsin-Like Immunoreactivity

The biggest breakthrough in the diagnosis of exocrine pancreatic insufficiency was developing the serum trypsin-like immunoreactivity test, a blood test. Prior to this, an assortment of inaccurate fecal tests were used. The TLI test looks for a normal level of trypsin-like enzymes in the bloodstream. In normal animals, trypsin, an enzyme of protein digestion, is stored in the pancreas in an inactive form so as to avoid



On the left is the normal stomach, pancreas, and intestine in a dog or cat belly. On the right is the same organs in a dog or cat who has exocrine pancreatic insufficiency. Notice the atrophied pancreas.

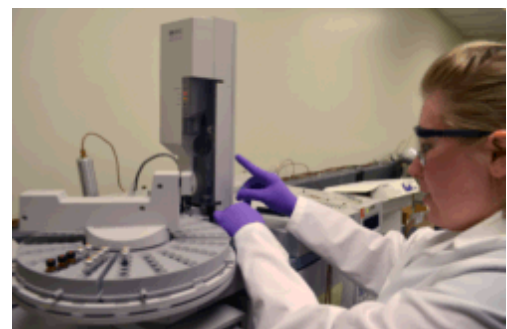


Photo courtesy of CDC

digesting one's own body with only trace amounts of active enzyme making it into the bloodstream. This is harmless, normal, and measurable in a blood test.

A dog or cat with EPI will have almost no serum trypsin-like immunoreactivity in the bloodstream. The patient must be fasted for the test to be accurate, but only a single blood sample is needed to make the diagnosis. The feline version of this test often requires that the sample be sent to a university laboratory and generally a week or so is needed to get results but the canine test can be run in just a few days.

Other Tests

Another popular diagnostic is the fecal protease test, where a stool sample is tested for protein digesting enzymes. Fasting is not necessary and any fecal sample will do; however, three consecutive samples are needed to get a consistent result as there is tremendous variability in fecal enzyme activity over the day. Sometimes soybeans are given to dogs to help stimulate release of pancreatic protein digestion enzymes and get a more accurate test.

The fecal elastase test (elastase is another digestive enzyme) is the newest test and it is only available for dogs. A single fecal sample is needed but the problem is that sometimes normal dogs will test negative for elastase. This means that EPI can be ruled out when the elastase test is positive but not confirmed when the elastase test is negative.

Treatment

Dietary supplementation with digestive enzymes is an effective therapy for EPI even though most of the supplement given is digested in the stomach along with other dietary proteins. The little bit that survives the acid bath of the stomach and the patient's own protein-digesting chemicals turns out to be enough to stop the diarrhea and enable the patient to actually gain some weight. Powdered enzymes (Viokase-V, Pancrezyme, PanaKare, and other brands) seem to work the best; tablets are available but do not seem to break down consistently. If the pet finds the taste of the enzymes objectionable, a compounding pharmacy can fill gel capsules with the powder. Again, enteric-coated tablets simply do not seem to work well.

In the past, it was suggested that incubating the enzymes in the patient's food would help initiate the digestion process in the food bowl but this has not been found to be true; the enzymes can be fed immediately mixed with the patient's regular pet food. Some patients respond best when an H2 blocker-type antacid (such as famotidine) is given concurrently with the enzymes.

It is important to thoroughly mix the enzyme powder into the food, because if it is sprinkled on top, it can be abrasive and lead to ulceration in the pet's mouth. If ulceration has already occurred in this situation, incubating the food with the enzymes can help resolve the problem. A six-hour incubation at room temperature should suffice. If the food is to be refrigerated, a 24-incubation has been recommended.

Raw beef or lamb pancreas can also be used as a possibly inexpensive form of enzyme replacement but the problems with raw foods include parasite and bacterial contamination. Cooking the pancreas relieves these concerns but inactivates the desired digestive enzymes. Raw pancreas can be stored frozen without losing digestive enzyme activity.

Generally a high-digestibility diet is the best choice for an EPI patient. These foods are low in fiber and may be especially helpful for patients with trouble gaining weight. Many animals simply use enzymes mixed with their regular food if prescription diets prove too expensive.

EPI patients commonly have an overgrowth of bacteria in their intestines, which means that the unabsorbed nutrients in the tract have fed the bacteria living there, instead of the patient, and an over-population of bacteria has occurred. This results in a vitamin B-12 (also called cobalamin) deficiency as the bacteria consume the vitamin instead of the patient getting his share). A course of antibiotics is helpful to correct this problem, especially early in the course of treatment. Periodic injections of vitamin B-12 and blood test monitoring have been recommended for patients with EPI. The B-12/cobalamin deficiency is a particularly big problem for cats with EPI, who typically require injections every couple of weeks for life. Folate deficiency is also common in cats and supplements are required for the first month of therapy. Regular cobalamin and folate blood levels important for cats with EPI. Supplementation with the fat soluble vitamins (especially vitamin K and vitamin E) are not usually needed.

Treatment is for life and without enzyme supplementation, all the unpleasant symptoms will recur. The good news is that a response to therapy is generally seen within a week of beginning it. Response can be excellent but approximately one dog in five will simply not respond well. Many do not ever regain a normal amount of weight.

What if Results Are not as Rapid as Expected?

Most pets respond in a matter of days to enzyme supplementation but if a week or so goes by and results are underwhelming, here are some tips to consider:

- Use more enzyme powder with each meal.
- Check the powder's expiration date. Consider a different brand of powder.
- Be sure to supplement vitamin B12 by injection. Many pets will not get better until this deficiency is corrected
- Treat the bacterial imbalance. Some patients will not get better without a course of antibiotics.
- Consider incubating the enzymes in the food. This is not supposed to matter but some pet owners feel that it does.
- Consider a prescription diet if one is not already in use.

If all of these factors are already controlled and diarrhea still has not cleared up, it may be time to consider that a second disease is afoot. Discuss this possibility with your veterinarian.

Want more support online? Join an [Exocrine Pancreatic Insufficiency Forum](#) for dog owners.

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