

Exocrine Pancreatic Insufficiency (Maldigestion Disorder) in Dogs

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We are asked many, many questions about the diagnosis and treatment of pancreatic diseases in the dog, specifically, those dealing with the digestion and absorption of nutrients. Such diseases are termed pancreatic insufficiency, exocrine pancreatic insufficiency, and maldigestion syndrome.

The pancreas has many glandular functions, some obvious and well known and others that are obscure and not understood at all. We classically think of the pancreas as the producer of insulin, and an insufficient production of that hormone leading to diabetes mellitus. For many dog owners, diabetes is easy to understand since they can think of it in terms of the disease seen in our fellow humans. Many people, however, have difficulty understanding diseases that affect the ability of the organ to produce the various enzymes that allow humans, dogs, and cats to digest their food.

Function of the pancreas

Certain cells of the pancreas called 'acinar' cells produce the important digestive enzymes utilized by the dog's body. The function of the enzymes is to break down food in the intestine into smaller molecules. The major digestive enzymes are protein molecules that are produced and stored in the pancreas. They include trypsin, chymotrypsin, amylase, and lipase. The trypsin and chymotrypsin break down protein molecules, the amylase breaks down starches, and lipase does the same to fats and triglycerides.

Breaking down the molecules of food into smaller sizes is an important part of the overall digestive process and allows nutrients to be absorbed by the cells that line the intestine. The nutrients are then passed from those cells into the bloodstream. There they can be transported throughout the body for use by the various tissues. When a dog eats a meal it stimulates the release of these enzymes. They flow from the pancreas into the anterior small intestine through a small tube called the pancreatic duct. Only after they reach the lumen or center of the intestine does their functional existence begin.

What is pancreatic insufficiency?

The disease characterized by a decrease or absence of these enzymes in the dog is referred to as 'exocrine pancreatic insufficiency' or 'maldigestion syndrome.' When dogs have this disorder, the proteins, starches, and fats found in their diet cannot be broken down into small enough pieces that allow them to be absorbed through the intestinal wall. The value and substance of the food, therefore, stays in the gastrointestinal tract and is passed out in the feces undigested. The affected dog, without treatment, literally starves to death even though it may be constantly eating. It is estimated that 90% of the pancreas must be destroyed before we see symptoms of insufficiency.

What causes pancreatic insufficiency?

There are several potential causes of pancreatic insufficiency. Chronic pancreatitis (inflammation of the pancreas) is a common cause of pancreatic insufficiency. In some young animals (usually less than two years of age), the cells of the pancreas just start decreasing in number and functioning. The cause for this is unknown, but it may be an inherited condition. Many different dog breeds can be affected, however, it is more common in large breeds, especially German Shepherds.

Signs of pancreatic insufficiency

Regardless of its cause, the signs associated with exocrine pancreatic insufficiency are usually obvious and fit a distinct pattern. The disorder may come on gradually over a long period of time or it may develop rapidly over a period of a week or two. The animals with the condition show rapid weight loss caused by loss of body fat, and muscle atrophy. The hair coat has poor quality. There is usually diarrhea with the stools being light yellow or clay-colored, with the consistency of mashed potatoes. In some cases, it may even be watery, without any form at all. Depending on the diet, there may be large quantities of undigested fat present in the stool. The animal will seem constantly hungry and eat as much food as it can ingest at one time. It will often eat abnormal things such as plants, dirt, or its own feces (though pancreatic insufficiency is a rare cause of stool eating in dogs). The animal, in its appearance and behavior, typifies one that is starving to death, and in reality, he is.

Diagnosis of pancreatic insufficiency

In most cases, a presumptive diagnosis can be made from clinical signs alone and it is then proven by one of several available tests used to accurately diagnose pancreatic insufficiency. These include:

- determining the levels of certain digestive enzymes in the blood (serum trypsin-like immunoreactivity), which is the most reliable
- measuring the level of chymotrypsin activity
- determining the levels of digestive enzymes in the stool (fecal proteolytic activity)
- examining the stool under the microscope (least reliable)

In its appearance and behavior, a dog with pancreatic insufficiency looks like one who is starving to death - and in reality, he is.

Fortunately, treatment can easily be accomplished. Unfortunately, it is an expensive and lifelong proposition. Treatment involves replacing the dog's pancreatic enzymes with enzymes from other sources. Our only source of medications for these cases is products made through an expensive process, using freeze-dried and ground-up extracts of hog and cattle pancreases. These glands are harvested in meat packing plants and then processed solely for this purpose. They are formulated either into tablets or powder and go under such trade names as Viokase or Pancrezyme. They contain large quantities of the same naturally occurring digestive enzymes that are deficient in the affected pet. The enzymes begin working when they come into contact with food. The tablets are given prior to a meal or may be crushed and mixed with food. The powder is usually mixed with food and allowed to set for about 30 minutes before feeding. Response to therapy is immediate and the animal will usually return to near normal health. Unfortunately, cost becomes the major hurdle in treating pancreatic insufficiency. An affected dog, for instance, will need \$60-100 worth of medication every month. Research is underway to develop synthetic digestive enzymes, and hopefully, will lower the price of treating these patients.

In some instances, raw pig pancreas can be used. The pancreas needs to come from animals certified as healthy by an approved meat inspector. Accurate dosing is more difficult with the raw pancreas, but in general, a 45-pound dog would need to receive 3 to 4 ounces of the chopped pancreas. The raw pancreas can be frozen at -4 F for up to 3 months and still retain its enzyme activity.

If the dog does not respond well to the addition of the digestive enzymes in Viokase or Pancrezyme, the diet may sometimes need to be altered. A highly digestible diet is fed, medium chain triglycerides may be added as fat sources since they do not require breakdown by pancreatic enzymes, and multiple vitamin supplements are given (especially [Vitamin B12 \(cobalamin\)](#) and the [fat-soluble vitamins A, D, E, and K](#)).

Since the deficiency is one of enzymes and is cured by the addition of the same enzymes back into the diet, many dog owners regretfully try other cures. There are many products, nutritional and otherwise, that advertise they contain natural enzymes which aid in digestion. Examples of these are K-ZYME, ProBalance, Prozyme, and so on. These really do contain real and natural enzymes and in normal dogs can be very useful nutritional supplements. However, they are not the enzymes associated with Pancreatic Insufficiency. This is a very specific disorder with specific enzymes needed to correct it. The general nutritional supplement will do no harm, but regretfully, they will do no good either.

We occasionally see patients in which the pancreatic insufficiency is only temporary and somehow resolves itself in 6 to 8 months, but these are rare exceptions. In these cases, it is thought that the cells responsible for the production of the enzymes have been irritated in some way but not permanently damaged. When they recover from the incident, whatever it was, their ability to produce these enzymes returns.