

THE PET HEALTH LIBRARY

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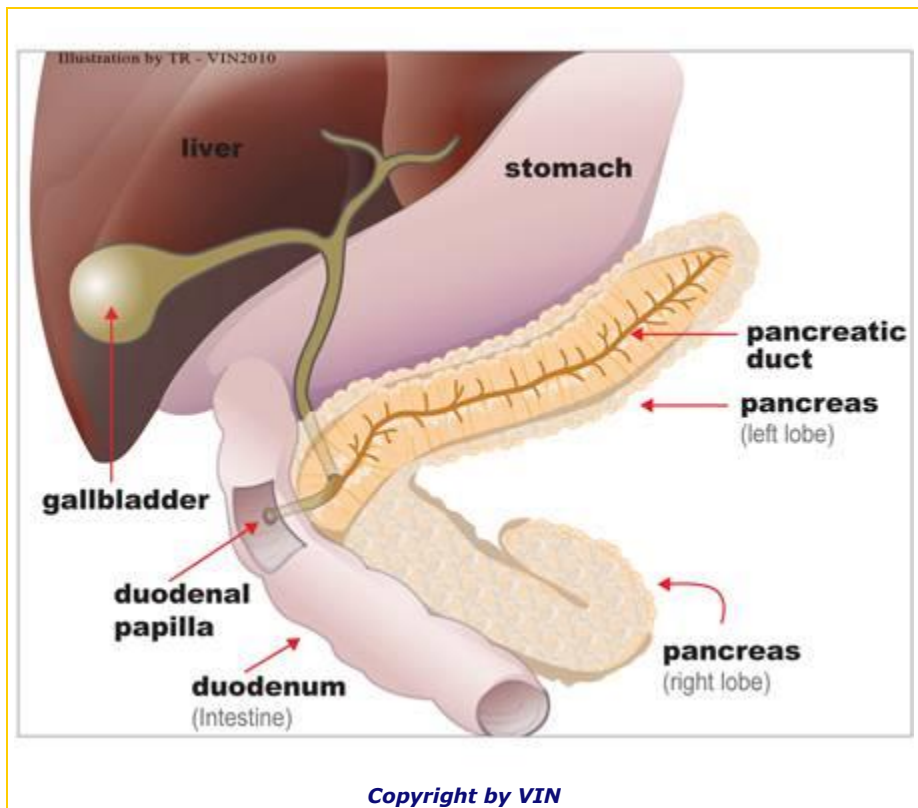
Canine Pancreatitis

The Normal Pancreas and What it Does

We eat food, chew it up into slurry, and swallow it. It travels down the esophagus to the stomach where it is ground up further and enzymes are added to begin the breakdown of dietary nutrients (digestion). When the food particles are small enough, they are propelled into the small intestine for further digestive treatment and ultimately nutrient absorption.

The small intestine has three portions: the duodenum that connects to the stomach and the jejunum and ileum below. The jejunum and ileum are mostly involved in absorption but the duodenum, being so close to the stomach, is the site of further digestion.

There are two ducts that enter the duodenum near where the stomach contents enter. One duct is for bile, squirted in directly from the liver's gall bladder. The bile serves to neutralize the acid that the stomach has added, to dissolve dietary fats for absorption later in the tract, and also to excrete some toxins. The other duct is the pancreatic duct that squirts in more digestive enzymes so as to break down starches and continue the break down of protein.



The pancreas is a pale pink glandular organ that nestles cozily just under the stomach and along the duodenum. As a glandular organ, the pancreas is all about secretion. It has two main jobs: the first job is to secrete digestive enzymes to help us break down the food we eat, the second job is to secrete insulin and glucagon (to regulate sugar metabolism). The digestive enzymes are the part of the story that concerns us in pancreatitis.

Pancreatitis is Inflammation of the Pancreas

Swollen, inflamed pancreas with areas of hemorrhage



In pancreatitis, inflammation disrupts the normal integrity of the pancreas. Digestive enzymes that are normally safely stored in granules are released prematurely and they digest the body itself. The result can be a metabolic catastrophe. The living tissue becomes further inflamed and the tissue damage quickly involves the adjacent liver. Toxins released from this organ of tissue destruction are released into the circulation and can cause a body-wide inflammatory response. If the pancreas is affected so as to disrupt its ability to produce insulin, **diabetes mellitus** can result; this can be either temporary or permanent.

Specific Pancreatitis Disasters

Specific disasters include the disruption of surfactants in the lung tissue that normally keep the tiny air-filled alveoli from collapsing after each exhaled breath. Without surfactants, the alveoli close up and respiratory failure results.

A syndrome called Weber-Christian syndrome, in which fats throughout the body are destroyed, has painful and disastrous

results.

Pancreatitis is one of the chief risk factors for the development of what is called disseminated intravascular coagulation, or DIC, which is basically a massive uncoupling of normal blood clotting and clot dissolving mechanisms. This uncoupling leads to abnormal simultaneous bleeding and clotting of blood throughout the body.

Pancreatic encephalopathy (brain damage) can occur if the fats protecting the central nervous system become digested.

The good news is that most commonly the inflammation is confined to the area of the liver and pancreas, but even with this limitation pancreatitis can be painful and life-threatening.

Pancreatitis can be acute or chronic, mild or severe.

What Causes Pancreatitis

In most cases we never find out what causes it, but we do know some events that can cause pancreatitis.

- Reflux of duodenal contents into the pancreatic duct. The pancreas has numerous safety mechanisms to prevent self-digestion. One mechanism is storing the enzymes it creates in an inactive form. They are harmless until they are mixed with activating enzymes. The strongest activating enzymes are made by duodenal cells; the digestive enzymes do not activate until they are out of the pancreas and mixing with food in the duodenum. If duodenal fluids backwash up the pancreatic duct and into the pancreas, enzymes are prematurely activated and pancreatitis results. This is apparently the most common pancreatitis mechanism in humans, though it is not common in veterinary patients.
- Use of certain drugs can predispose to pancreatitis (sulfa-containing antibiotics such as **trimethoprim sulfa**, chemotherapy agents such as **azathioprine** or **L-asparaginase**, and the anti-seizure medication **potassium bromide**). Exposure to organophosphate insecticides has also been implicated as a cause of pancreatitis. Exposure to steroid hormones have traditionally been thought to be involved as a potential cause of pancreatitis but this appears not to be true, though steroids are able to cause an increase in lipase blood tests.

- Trauma to the pancreas that occurs from a car accident or even surgical manipulation can cause inflammation and thus pancreatitis.
- A tumor in the pancreas can lead to inflammation in the adjacent pancreatic tissue.

Miniature Schnauzers are predisposed to pancreatitis as they commonly have altered fat metabolism.

Signs of Pancreatitis

The classical signs in dogs are appetite loss, vomiting, diarrhea, painful abdomen, and fever.

Making the Diagnosis

A reliable blood test has been lacking for this disease until recently. Traditionally, blood levels of amylase and lipase (two pancreatic digestive enzymes) have been used. When their levels are especially high, this has been felt to be a reasonable sign that these enzymes have leaked out of the pancreas and the pet still has pancreatitis, but still, these tests are not as sensitive or specific as we would prefer. Amylase and lipase can elevate dramatically with corticosteroid use, with intestinal perforation, kidney disease, or even dehydration. Some experts advocate measuring lipase and amylase on fluid from the belly rather than on blood but this has not been fully investigated and is somewhat invasive.

A newer test called the PLI or pancreatic lipase immunoreactivity test has come to be important. As mentioned, lipase is one of the pancreatic digestive enzymes and only small traces are normally in circulation. These levels jump dramatically in pancreatitis and the diagnosis can be confirmed with a less expensive and non-invasive test. A regular lipase level measures all forms of lipase, not just those of a pancreatic source; this test is specific for pancreatic lipase. The problem is that the technology needed to run this test is unique and the test can only be run in certain facilities on certain days. Results are not necessarily available rapidly enough to help a very sick patient.

More recently a new test called the SPEC cPL (specific canine pancreatic lipase) test has become available. This test is a newer generation immunological test for canine pancreatic lipase and can be run overnight by a reference lab. This test can detect 83% of pancreatitis cases (the test is 83% sensitive) and excludes other possible diseases in 98% of cases (i.e., the test is 98% specific for pancreatitis). The test can be run in a laboratory yielding a number that can be used for monitoring the patient, or it can be run as an in-house test kit. The in-house test kit yields a negative or positive (for pancreatitis) result rather than an actual number that can be used for monitoring. A negative in-house test rules out pancreatitis but a positive test is best followed by the laboratory test so an actual number can be obtained.

Radiographs can show a widening of the angle of the duodenum against the stomach, which indicates a swelling of the pancreas. Most veterinary hospitals have the ability to take radiographs but this type of imaging is not very sensitive in detecting pancreatitis and only is able to find 24% of cases.

Ultrasound, on the other hand, detects 68% of cases and provides the opportunity to image other organs and even easily collect fluid from the belly. Since pancreatitis can be accompanied by a tumor near the pancreas, ultrasound provides the opportunity to catch such complicating factors.

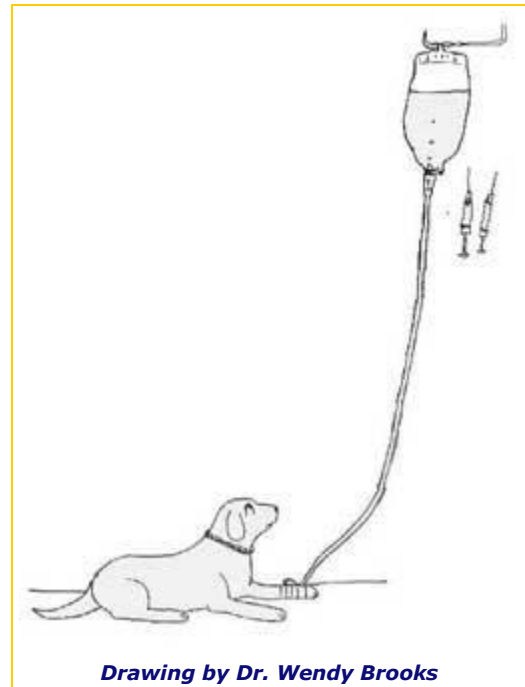
In some cases, surgical exploration is the only way to make the correct diagnosis.

Treatment



Traditionally, it has been believed that the passage of food through the duodenum stimulates the pancreas to secrete its digestive enzymes and that in the treatment of canine pancreatitis we do not want any stimulation of the pancreas; we want the pancreas to rest. This meant no food and no water for 2-3 days (IV fluid support prevents dehydration). This traditional fasting has more recently been set aside and fasting the patient is conducted only insofar as to control the vomiting associated with pancreatitis. The passage of food through the GI tract actually helps maintain the health of the intestinal cells but the food provided in this situation should be restricted in fat. Some patients will recover fully after pancreatitis and be able to return to regular food, but those who have chronic on-going pancreatitis or who are prone to frequent flare ups will likely require a fat-restricted diet for life. Fat restriction is important in both treatment and prevention.

The most important feature of treatment is aggressively rehydrating the patient with intravenous fluids as this restores the circulation to the pancreas and supports the natural healing mechanisms of the body. Pain medication and nausea medication are needed to keep the patient comfortable, restore interest in food, and prevent further dehydration.



Antibiotics are sometimes given although pancreatitis in and of itself rarely is caused by bacterial infection. The dehydration that occurs subsequent to the vomiting, diarrhea and appetite loss in pancreatitis may alter the natural barriers against the intestinal bacteria, however, and antibiotics may play a role in preventing secondary infections.

Plasma transfusion is somewhat controversial in pancreatitis treatment. On one hand, plasma replenishes some of the natural blood proteins that are consumed by circulating digestive enzymes and would seem to make sense in pancreatitis treatment. In humans with pancreatitis, however, no benefit has been shown with plasma transfusion. Whether or not the protection afforded by plasma is real or theoretical is still being worked out, but since it is difficult to go wrong with a plasma transfusion, do not be surprised if your veterinarian uses this approach.

Beware of Diabetes Mellitus

When the inflammation subsides in the pancreas, some scarring is inevitable. When 80% of the pancreas is damaged, insulin cannot be produced and **diabetes mellitus** results. This may or may not be permanent depending on the capacity for the pancreas's tissue to recover.

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