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Medicine: Liver Testing

The liver is a very important organ. It has many functions including: the production of substances such as proteins, clotting factors, cholesterol, bile (a substance important in digestion), and urea (a less toxic form of ammonia); storage of carbohydrates (sugars and starches) and lipids (fats); and metabolism of many substances including drugs, chemicals, and toxins. Because it is involved in so many processes your veterinarian may suggest bloodwork to make sure your pet's liver is healthy. This is especially important in senior patients (animals 7 years of age or older), if your pet is ill, or before your pet undergoes a procedure requiring general anesthesia. Many liver problems if recognized and addressed early are treatable. With regular bloodwork it is often possible to catch changes associated with liver disease before the animal develops symptoms of liver disease/liver failure.

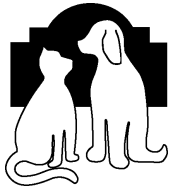
Due to the many diverse functions of the liver there is a broad range of symptoms associated with liver disease/failure. The most common of these are: vomiting, weight loss, anorexia, jaundice, mouth ulcers, increased drinking and urination, bleeding, mental depression, pressing the head into walls or standing facing into walls, and seizures. The symptoms seen will depend on the reason for and the severity of the liver malfunction. The patient is considered to be in liver failure when at least 75% of liver function is lost and the pet is showing symptoms of liver disease.

There are many ways of assessing the health of the liver. A complete history and good physical examination are essential. There are also multiple blood tests available to assess the liver. The first of these we will discuss are called liver enzymes. There are many of these enzymes, but the most common ones assessed in dogs and cats are ALT, ALP, AST and GGT. These are substances contained either within the cells of the liver or attached to the walls of the cells that comprise the liver. Baseline (normal) levels of these enzymes are caused by normal turnover of cells and normal liver function. These enzymes may become elevated either by increased production by the liver in response to a stimulus or if the enzymes leak out of the cells due to damage. Liver enzymes may be elevated due to liver disease including infection, parasites, inflammation, cancer, trauma, or developmental. Liver enzymes may also become elevated in conditions occurring outside of, but effecting the liver. These include Pancreatitis, Cushing's disease, trauma, hyperthyroidism, diabetes mellitus, metabolic dysfunction, and ingestion of chemicals including toxins and certain medications.

As you can tell by the list above, elevation of liver enzymes is a very nonspecific indicator that something is effecting the liver. Your veterinarian cannot tell from the liver enzyme levels alone, exactly what is causing the elevation in enzyme level. Elevated liver enzymes do not indicate whether or not the liver is capable of performing its functions.

There are other tests available to test liver function; five of these can be found on the regular blood chemistry panel. These include: glucose, cholesterol, BUN (blood urea nitrogen), albumin, and bilirubin. Sometimes one or more of these values may be abnormal even with a normal level of liver enzymes. This may indicate a problem with liver function that is not causing enough damage of liver cells or increased enzyme synthesis to cause an increase in liver enzymes on the blood panel. Sometimes these five tests may be normal, but the liver enzymes are elevated. If this elevation persists or is high enough that your veterinarian is concerned about liver function he/she may suggest additional liver function testing.

A test called a Serum Bile Acids test specifically measures liver function. Bile acids are important in the



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digestion of fats. They are made in the liver and stored in the gall bladder. They are released into the intestine after a meal is consumed and after they help with digestion they are reabsorbed from the intestine and travel back to the liver. Elevated bile acids indicates a problem either in the secretion of bile acids into the bile or in the return of bile acids to the liver. The level of serum bile acid increase correlates with the approximate severity of lack of liver function. This test requires two blood samples taken two hours apart. The first sample is taken after a 12 hour fast, and the second is taken 2 hours after a meal. With this test your veterinarian will be able to tell if your pet's liver is not functioning as well as it should. However, this test does not pinpoint the reason why the liver may not be functioning.

If the bile acids test is abnormal your veterinarian may suggest getting a sample of the liver tissue. This can be done either with surgery or with an ultrasound-guided biopsy. A pathologist then analyzes the sample. By evaluating the tissue directly the reason for the liver malfunction can be ascertained. Once your veterinarian knows why the liver is not functioning normally he/she will be able to suggest treatment for the specific condition, discuss possible complications, and give you a more accurate prognosis regarding recovery.

In summary, the liver is involved in many processes in the body. For this reason it is important to make sure the liver is functioning well. Elevated liver enzymes indicate that something is affecting the liver. There are other blood tests that may indicate liver problems as well. The best way to assess liver function is a bile acids test. If the liver is not functioning a biopsy may help ascertain why it is not functioning and guide treatment.