

## JAUNDICE

### What is jaundice?

It means that a yellow pigment is found in the blood and in the tissues. It is most easily seen in the gingiva (gums), the sclerae (white part of the eyes), and the pinnae (ear flaps). However, if these tissues normally have a dark colour, jaundice will probably not be seen.

### What causes jaundice?

The causes of jaundice fall into three major categories:

1. Liver disease. Any disease that causes destruction of liver cells or causes bile to become trapped in the liver can cause jaundice.
2. Obstruction of the bile duct. The bile duct carries an important fluid for digestion, bile, from the gall bladder to the small intestine. Obstruction can occur within the gall bladder or anywhere along the bile duct.
3. Destruction of red blood cells. The process of red cell destruction is known as haemolysis. It can occur within blood vessels (intravascular) or in the spleen and liver (extravascular).

### How is the exact cause determined?

Within each category listed above are several possible causes. Determining the cause of jaundice requires a series of tests. Some of these tests determine which category is involved. Once that is known, other tests are done to look for a specific disease which is leading to the jaundiced state.

### What tests determine haemolysis?

Since severe red cell destruction needs to occur before jaundice develops and because an estimation of the numbers of red cells present can be done quickly and easily, determination of red blood cell numbers is one of the first tests performed on the jaundiced patient. The packed cell volume (PCV) is a centrifuge-performed test that separates the red blood cells from the serum or plasma (the liquid parts of the blood) and expresses the packed cells as a percentage of the whole.

### What causes haemolysis?

Haemolysis can be caused by toxic plants, chemicals, or drugs, parasites on the red blood cells, heartworms, autoimmune diseases, and cancer. Several tests are needed to determine which of these is the cause.

### What tests determine the presence of liver disease?

A biochemistry profile is performed on dogs with jaundice. This is a group of 20-30 tests that are performed on a blood sample. This profile contains several tests that are specific for liver disease. The main ones are the alanine aminotransferase (ALT), aspartate aminotransferase (AST); alkaline phosphatase (ALP), and the proportions of different types of bilirubins present in the blood.

Although each of these tests look at the liver from a slightly different perspective, ultimately they only determine that liver disease is occurring. None of them is able to determine the exact

cause of the disease. To make that determination, a biopsy of the liver is necessary. This can be done in three ways.

1. **Fine-needle aspirate.** To perform this procedure, a small gauge needle is inserted through the skin into the liver. A syringe is used to aspirate some cells from the liver. The cells are placed on a glass slide, stained, and studied under a microscope. This is the least invasive and quickest test, but it has certain limitations. Because only a few cells are obtained, it is possible that a representative sample from the liver will not be obtained. It is also not possible to view the cells in their normal relationship to each other (ie., tissue architecture). Some diseases can be diagnosed with this technique, and others cannot.
2. **Needle biopsy.** This procedure is similar to the fine-needle aspirate except a much larger needle is used. This needle is able to recover a core of tissue, not just a few cells. The sample is fixed in formaldehyde and submitted to a pathologist for analysis. General anaesthesia is required, but the dog is anaesthetised for only a very short period of time. If it is done properly and with a little luck, this procedure will recover a very meaningful sample. However, the veterinary surgeon cannot choose the exact site of the liver to biopsy because the liver is not visible. Therefore, it is still possible to miss the abnormal tissue.
3. **Surgical wedge biopsy.** The dog is placed under general anaesthesia, and the abdomen is opened surgically. This permits direct visualisation of the liver so the exact site for biopsy can be chosen. A piece of the liver is surgically removed using a scalpel. This approach gives the most reliable biopsy sample, but carries the greatest risk since general anaesthetic and major surgery is involved. The cost of this evaluation also is considerable.
4. **Ultrasound guided biopsy.** Here a needle biopsy is carried out but the area of liver sampled can be selected using ultrasound. This technique carries fewer risks than (3) but is more expensive. Usually a very short acting anaesthetic is necessary.

### **What causes liver disease?**

The most common causes of liver disease include bacterial infections, viral infections, toxic plants, chemicals, or drugs, cancer, autoimmune diseases, and certain breed-specific liver diseases.

### **What tests determine bile duct obstruction?**

Dogs with obstructed bile ducts are usually extremely jaundiced. Their yellow colour can often be seen readily in the skin, as well as the sclerae and gingiva. However, an evaluation of the gall bladder and bile duct is necessary to be sure that obstruction is present. An ultrasound examination is the most accurate non-invasive way to evaluate the gall bladder and bile duct. This technology uses sound waves to "look" at the liver, gall bladder, and bile duct. If this is not available, radiographs (x-rays) should be taken of the liver. However, sometimes exploratory surgery is necessary to properly evaluate the dog for biliary obstruction.

### **What causes bile duct obstruction?**

The most common causes of bile duct obstruction include pancreatitis, trauma, cancer, gall bladder stones, and severely thickened bile.

### **How is jaundice treated?**

Jaundice is not a disease; it is a sign that disease is present. Therefore, there is not a specific treatment for jaundice. Jaundice will resolve when the disease that causes it is cured.

The basis for resolving jaundice is to diagnose the underlying disease. When the proper testing is done, this is usually possible. Then, treatment can begin.