

## ICTERUS IN DOGS

### *What is icterus?*

Icterus is also known as jaundice or yellow 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 color, icterus will probably not be seen.

### *What causes icterus?*

The causes of icterus fall into three major categories:

1. **Destruction of red blood cells.** The process of red cell destruction is known as hemolysis. It can occur within blood vessels (intravascular) or in the spleen and liver (extravascular).
2. **Liver disease.** Any disease that causes destruction of liver cells or causes bile to become trapped in the liver can cause icterus.
3. **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.

### *How is the exact cause determined?*

Within each category listed above are several possible causes. Determining the cause of icterus 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 icteric state.

### *What tests determine hemolysis?*

Since hemolysis results in red blood cell destruction, determination of red blood cell numbers is one of the first tests performed on the icteric patient. There are three tests that may be used for this. The **red blood cell count** is an actual machine count of red blood cells. 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). The **hematocrit** is another way to determine if there is a reduced number of red blood cells. All three of these tests are part of a complete blood count (CBC).

### *What causes hemolysis?*

Hemolysis can be caused by toxic plants, 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 chemistry profile is performed on dogs with icterus. This is a group of 20-30 tests that are performed on a blood sample. The chemistry 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 total bilirubin. If these tests are normal, and there is reason to

suspect liver disease, a bile acid analysis is performed.

Although each of these look at the liver from a slightly different perspective, ultimately they only determine that liver disease is occurring. None of them are 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 (i.e., 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 anesthesia is required, but the dog is anesthetized 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 veterinarian 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 anesthesia, and the abdomen is opened surgically. This permits direct visualization 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 the stress of surgery and the expense are the greatest of all of the biopsy methods.

#### ***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 icteric. Their yellow color 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 icterus treated?***

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

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