

## ICTERUS IN CATS

Icterus is also known as jaundice or yellow jaundice, meaning that a yellow pigment is found in the blood and in the tissues. It is most easily seen in the gums, the sclerae (white part of the eyes), and the pinnae (ear flaps). However, if these tissues normally have a dark color, icterus may not be seen.

### *What makes a cat likely to develop icterus?*

Risk factors for icterus may include the presence of fleas or ticks, infection with feline leukemia virus or feline infectious peritonitis virus, residence in or travel to areas endemic for liver flukes or fungal diseases, prolonged anorexia, and ingestion of drugs or toxins.

### *What are the clinical signs?*

A yellow color is noted in the skin, white part of the eyes, or on the ear flaps.

### *What are the causes?*

The causes of icterus fall into three major categories:

- 1. Destruction of red blood cells.** This can occur within blood vessels (intravascular) or in the spleen and liver (extravascular). The process of red cell destruction is known as hemolysis.
- 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 diagnosis made?*

Diagnosis of icterus itself is straightforward. However, determining the cause of icterus can be a challenge and usually requires a series of tests. Within each category listed above are several possible causes of icterus. Once the probable cause can be placed into one of these three categories, additional tests are performed to look for a specific disease which is leading to the icteric state.

Occasionally, blood is drawn and the serum component is found to be yellow before the cat is visibly jaundiced. This information is helpful and can give a clue to impending problems.

### **Hemolysis as a cause of icterus**

Since hemolysis results in destruction of erythrocytes (red blood cells), determination of erythrocyte numbers is one of the first tests performed on the icteric patient. There are three tests which 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 which 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).

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

is the cause.

### **Liver disease as a cause of icterus**

A chemistry profile is performed on cats 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 yet there is reason to suspect liver disease, a bile acid analysis is performed.

Although each of these tests is used to “look” at the liver from a slightly different perspective, ultimately they only determine that liver disease is present. None of them are able to determine the exact *cause* of the disease. To make that determination, a study of liver tissue (biopsy) or liver cells (cytology) is necessary. This can be done in three ways.

**1. Fine-needle aspirate and cytology.** 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 cat 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 cat 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.

Some of the causes of liver-related icterus include infectious diseases (feline leukemia, feline infectious peritonitis, fungal diseases), neoplasia, hepatic lipidosis (fatty liver), and cholangiohepatitis complex.

### **Bile duct obstruction as a cause of icterus**

Cats 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 ducts is necessary to be sure that obstruction is present. An ultrasound examination is the most accurate and 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 cat for biliary obstruction. The most common causes of bile duct obstruction include pancreatitis, trauma, cancer, gall bladder stones, liver flukes, and severely thickened bile.

#### ***What do we do to treat icterus?***

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.

#### ***Will my cat recover?***

The prognosis is dependent upon the underlying cause. Some diseases causing icterus are fatal, but others have a good prognosis for full recovery.