

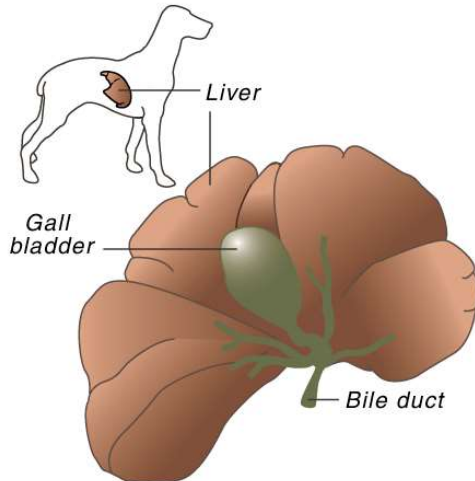
ICTERUS IN DOGS AND CATS

What is icterus?

Icterus is also known as jaundice or yellow jaundice, and is a sign of serious illness. It means that a yellow pigment called *bilirubin* is found in the blood and tissues. When icterus persists for any length of time, it will discolor many tissues and will be visible on most body surfaces, including the skin. Since most of your pet's skin is covered by fur, jaundice it is most easily seen in the gingivae (gums), the sclerae (white part of the eyes), and the pinnae (ear flaps). If these tissues normally have a dark color, icterus will be difficult to see in these pets.

What symptoms can icterus cause?

Icterus is not a disease; it is a sign that disease is present. However, when it is icterus is present it can cause your pet to feel bad. Icterus can result in poor energy, lack of appetite, and vomiting. You might also notice that the urine is dark in color – dark yellow or even orange if jaundice is severe.



What causes icterus?

The causes of icterus fall into three major categories:

Destruction of red blood cells. The process of red cell destruction is known as *hemolysis*. Destruction of the red blood cells released pigments into the blood that result in build-up of bilirubin, which causes jaundice. It can occur within blood vessels (*intravascular hemolysis*) or in the spleen and liver (*extravascular hemolysis*). A blood transfusion reaction can cause icterus. Other causes of hemolysis include auto-immune disease, blood parasites, ingestion of toxins, etc.

Liver disease. Any disease that causes destruction of liver cells or causes bile to become trapped in the liver can cause icterus.

The most common causes of liver disease in dogs include bacterial infections, viral infections, toxic plants, chemicals, drugs, cancer, autoimmune diseases, cirrhosis of the liver, and certain breed-specific liver diseases. Some of the causes of liver-related icterus in cats include pancreatitis, infectious diseases (feline leukemia (FeLV), feline infectious peritonitis (FIP), fungal diseases, cancer, parasite infections, hepatic lipidosis (fatty liver syndrome), and cholangiohepatitis complex.

Obstruction of the bile duct. The bile duct carries bile, an important fluid for digestion, from the gall bladder to the small intestine. Obstruction can occur within the gall bladder or anywhere along the bile duct.

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

How is the cause of icterus determined?

The diagnosis of icterus itself is usually straightforward, as the yellow color is seen in the tissues and blood. 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 the specific disease that is causing the icteric state.

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

What tests determine hemolysis?

The first steps to rule out hemolysis are tests on the red blood cells to see if they are being destroyed resulting in anemia. 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).

Hemolysis can be caused by toxic plants, drugs, parasites on the red blood cells, heartworm disease, autoimmune diseases, cancer, and other things. Several tests are needed to determine the cause of hemolysis in your pet, so that it can be treated successfully.

What tests are used to diagnose liver disease or gallbladder obstruction?

A biochemistry profile is performed on pets with icterus. This is a group of tests that are performed on a blood sample. The biochemistry profile contains several tests that are specific for liver disease. The main ones are the alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP or ALKP), 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 tests evaluates the liver, they only determine if liver disease is occurring. None of them are able to determine the exact cause of the disease. To make that determination, an ultrasound of the abdomen or even a biopsy of the liver may be necessary. A biopsy of the liver can be done in three ways.



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. Platelet count and bleeding time will need to be done, to see if this test is safe.

Needle biopsy. This procedure is similar to the fine-needle aspirate except a much larger needle is used. This needle is able to obtain 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 pet is anesthetized for only a very short period of time. Done properly, this test can provide valuable insight into the cause of liver disease and icterus at least 50% of the time.

Surgical wedge biopsy. The pet is placed under general anesthesia, and the abdomen is opened surgically. This permits direct observation 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. Clotting tests need to be done prior to either needle or wedge liver biopsy.

X-rays, ultrasound of other areas of the body, test for infectious diseases, toxicology tests, coagulation tests, and perhaps other tests may be required in order to get to the bottom of the cause of the jaundice.

How is icterus treated?

There is not a specific treatment for icterus, because it has many causes. 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 often possible. Treatment can begin as soon as a diagnosis is obtained.

If caused by hemolysis, one or more blood transfusions might be required in order to provide time to stop the hemolytic process. Liver disease is generally treated supportively, to give the live time to heal. If infectious diseases are present, they are treated if possible. If the gallbladder outflow is obstructed, sometimes surgery is required to relieve the obstruction.

No matter the cause, supportive treatments for jaundice might include intravenous fluids, drugs to control nausea and vomiting, and drugs to control inflammation in the body associated with the jaundice. If the blood is not clotting properly, vitamin K or blood transfusion might be given.

If icterus is not diagnosed and treated promptly, damage to the kidneys and/or brain can occur. It is especially important for jaundiced cats to keep eating, and sometimes a feeding tube is needed to save a yellow cat's life.

Will my dog or 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. Following hospitalization, you may need to provide intensive at-home nursing care, as recovery from jaundice takes time. Bilirubin becomes deposited in the fatty tissues of the body, and the yellow discoloration of the skin may not go away for days to weeks after your pet goes home.

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