

# Yellowish Discoloration to the Tissues of the Body (Jaundice or Icterus)

## Basics

### OVERVIEW

- Yellowish discoloration to the gums and other tissues of the body (known as “jaundice” or “icterus”)
- Serum total bilirubin concentration higher than normal levels, leading to the yellowish discoloration; may be present as unconjugated (bound to a blood protein called albumin) or conjugated (transported to the intestines in bile to be further broken down)
- “Bilirubin” is a normal bile pigment formed from the breakdown of hemoglobin; “hemoglobin” is the compound in the red blood cells that carries oxygen to the tissues of the body; the liver takes up the hemoglobin following normal or abnormal breakdown of hemoglobin and other iron-containing compounds such as myoglobin, and P450 cytochromes and that provides a means of eliminating bilirubin from the body
- Bilirubin levels in the blood can increase because more bilirubin is being made by the liver—in this case, more red blood cells are being broken down (known as “hemolysis”) than usual (causing “hemolytic jaundice”); bilirubin levels also can increase if the flow of bile is stagnant, keeping it from moving out of the liver or the amount of bilirubin exceeds processing limits (known as “cholestasis”, leading to hepatobiliary disease, and producing “hepatic jaundice”); or due to blocked bile duct (known as “post-hepatic jaundice”) –in all cases, bilirubin is not moved out of the body at a normal rate and the high levels lead to a yellow discoloration of the skin, moist (mucous) membranes and other tissues
- The liver is the largest gland in the body; it has many functions, including production of bile; bile ducts begin within the liver itself as tiny channels to transport bile—the ducts join together to form larger bile ducts and finally enter the extrahepatic or common bile duct, which empties into the upper small intestine; the system of bile ducts is known as the “biliary tree”
- The gallbladder is the storage unit for bile; bile is stored until it is needed for fat digestion



### SIGNALMENT/DESCRIPTION OF PET

## **Species**

- Dogs
- Cats

## **Breed Predilections**

- All breeds affected
- Breed predisposition for familial (runs in certain families or lines of dogs) liver disease—Doberman pinschers, Bedlington terriers, cocker spaniels, Dalmatians, Labrador retrievers

## **Mean Age and Range**

- Most causes—diseases of adult pets
- Young, unvaccinated dogs—at risk for infectious canine hepatitis

## **Predominant Sex**

- Adult female purebred dogs—at risk for accelerated destruction or removal of red blood cells related to an immune response, in which the body produces antibodies against red blood cells (known as “immune-mediated hemolytic anemia”)

## **SIGNS/OBSERVED CHANGES IN THE PET**

### **Increased Formation of Bilirubin—Breakdown of Red Blood Cells (Hemolysis)**

- Vague signs
- Sluggishness (lethargy), weakness
- Lack of appetite (known as “anorexia”)
- Constipation
- Vomiting
- Weight loss
- Yellowish discoloration to the gums and other tissues of the body (jaundice or icterus) or pale gums
- Rapid heart rate (known as “tachycardia”) and rapid breathing rate (known as “tachypnea”)
- Heart murmur
- Enlargement of the liver (known as “hepatomegaly”) and/or enlargement of the spleen (known as “splenomegaly”)
- Bleeding tendencies; low platelet or thrombocyte count (known as “thrombocytopenia”); “platelets” and “thrombocytes” are names for the normal cells that originate in the bone marrow and travel in the blood as it circulates through the body; platelets act to “plug” tears in the blood vessels and to stop bleeding
- Orange feces
- Fever
- “Gelatinous” feel to skin (due to disease of the blood vessels [known as “vasculopathy”])
- History of recent blood transfusion
- Severe trauma: bleeding into muscle or abdomen or formation of a localized mass of blood in a tissue or organ (known as a “hematoma”)
- Post-exercise, if above level of fitness, sometimes myoglobin breaks down (referred to as rhabdomyolysis), this leads to weakness, pain, and orange-brown urine

### **Decreased Elimination of Bilirubin—Blockage of the Flow of Bile (Cholestasis)**

- Vague signs
- Sluggishness (lethargy)
- Lack of appetite (anorexia)
- Yellowish discoloration to the gums and other tissues of the body (jaundice or icterus)
- Change in color of urine
- Abdominal enlargement, if buildup of fluid in the abdomen (known as “ascites”) occurs
- Vomiting
- Diarrhea
- Increased urination (known as “polyuria”) and increased thirst (known as “polydipsia”)
- Altered mental status, if a brain disorder caused by accumulation of ammonia in the system due to inability of the liver to rid the body of ammonia (known as “hepatic encephalopathy”) is present
- Weight loss

- Enlargement of the liver (hepatomegaly) and/or enlargement of the spleen (splenomegaly)
- Possible mass in the abdomen; painful abdomen
- Change in color of stools: Black, tarry stools due to the presence of digested blood (known as “melena”) or pale or grayish coloration to the stools (known as “acholic feces”), due to the lack of bile pigments that cause the normal brown color of bowel movements: indicate complete blockage of the extrahepatic or common bile duct (extrahepatic bile duct obstruction)
- Fever

## CAUSES

### **Icterus or Jaundice Caused by Problems Before the Liver (Known as “Prehepatic Icterus or Jaundice”)**

- Disorders causing breakdown of red blood cells (hemolysis), such as immune-mediated hemolysis—certain drugs (propylene glycol carriers in cats, trimethoprim sulfa antibiotic); systemic lupus erythematosus (autoimmune disease in which body attacks its own skin and other organs); infectious disorders; toxins (such as zinc, onions, phenols); severe low levels of phosphates in the blood (known as “hypophosphatemia”), rarely, due to breakdown of muscle protein (myoglobin) following heavy exercise (rhabdomyolysis)
- Incompatible blood transfusion
- Infections—feline leukemia virus (FeLV); *Mycoplasma haemofelis*; heartworm; *Babesia*; *Ehrlichia*; *Cytauxzoon*
- Large volume blood resorption—localized mass of blood in a tissue or organ (hematoma), blood in body cavities (such as bleeding secondary to cancer [hemangiosarcoma], exposure to a product to decrease blood clotting [warfarin])

### **Icterus or Jaundice Caused by Problems Involving the Liver (Known as “Hepatic Icterus or Jaundice”)**

- Long-term (chronic) inflammation of the liver of unknown cause (so-called “idiopathic hepatitis”) or that runs in certain families or lines of pets (known as “familial hepatitis”)
- Adverse drug reactions—such as those that occur after the use of medications to control seizures (known as “anticonvulsants”); acetaminophen; trimethoprim-sulfa (an antibiotic); carprofen (a pain reliever or analgesic); medication to improve appetite and weight gain (stanozolol) in cats; tranquilizers (benzodiazepines) in cats
- Inflammation of the bile duct or biliary tree (known as “cholangitis”) and inflammation of the bile ducts and liver (known as “cholangiohepatitis”)
- Cancer—lymphoma; “lymphoma” is a type of cancer that develops from lymphoid tissue, contains lymphocytes, a type of white blood cell formed in lymphatic tissues throughout the body; lymphocytes are involved in the immune process
- Progressive damage and scarring of the liver (known as “cirrhosis”) in dogs
- Disease in which fats/oils (lipids) accumulate in the liver of cats (condition known as “feline hepatic lipidosis”)
- Massive death of liver tissue (known as “liver necrosis”), such as due to aflatoxin, excess copper, and drugs such as carprofen
- Generalized (systemic) illnesses with liver involvement—leptospirosis (dogs); fungal infection (histoplasmosis); feline infectious peritonitis (FIP); excess levels of thyroid hormone (known as “hyperthyroidism”) in cats; toxoplasmosis (cats)
- Generalized bacterial infection (known as “sepsis”)—originating anywhere in the body; bacterial products may impair liver processing/elimination of bilirubin

### **Icterus or Jaundice Caused by Problems After the Liver (Known as “Post-hepatic Icterus or Jaundice”)**

- Transient or persistent mechanical blockage of bile flow through the bile ducts: (1) inflammation of the pancreas (known as “pancreatitis”)—usually transient; (2) cancer—bile duct, pancreas, upper small intestine (known as the “duodenum”); (3) blockage of the bile duct—presence of hard, solid material in the bile duct (known as “cholelithiasis”), sludged (thick) bile, liver flukes (cats), immune-mediated duct destruction in cats (known as “sclerosing cholangitis”); (4) ruptured biliary tree causing leakage of bile and resulting inflammation of the lining of the abdomen (known as “bile peritonitis”)

## RISK FACTORS

- Young unvaccinated dogs—infectious disease such as infectious hepatitis

- Breed predisposition for familial (runs in certain families or lines of dogs) liver disease—Doberman pinschers, Bedlington terriers, cocker spaniels, Dalmatians, Labrador retrievers
- Middle-aged, obese dogs—inflammation of the pancreas (pancreatitis)
- Obese cats that have lost their appetite (known as “anorexia”)—disease in which fat/oil (lipid) accumulates in the liver (hepatic lipidosis)
- Drugs that are toxic to the liver
- Blunt abdominal trauma
- Long-term (chronic) biliary tract disease—leakage of bile and resulting inflammation of the lining of the abdomen (bile peritonitis)
- Low number of red blood cells due to breakdown of the cells (known as “hemolytic anemia”)

## Treatment

### HEALTH CARE

- Depends on underlying cause
- Inpatient—for initial medical care

### ACTIVITY

- Cage rest—to facilitate liver regeneration or reduce oxygen needs if severe anemia

### DIET

- Nutritional support—nutritionally balanced with maximum protein tolerated by the pet; carbohydrate based (dogs) with restricted protein for pets with the brain disorder caused by accumulation of ammonia in the system due to inability of the liver to rid the body of ammonia (known as “hepatic encephalopathy”); restrict sodium if pet has fluid buildup in the abdomen (ascites)
- Vitamin supplementation—water-soluble vitamins (vitamin B complex, vitamin C) in all affected pets; vitamin K1 injections for pets with bile duct blockage or diseases in which the flow of bile is decreased or stopped (cholestasis)

### SURGERY

- Surgery may be necessary to determine diagnosis (biopsy), or to treat certain conditions (such as bile duct blockage)

## Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Yellowish discoloration of the tissues due to problems before the liver (prehepatic)—eliminate inciting cause; whole blood transfusion for life-threatening low red blood cell counts (anemia)
- Yellowish discoloration of the tissues due to problems of the liver (hepatic) and problems after the liver (post-hepatic)—treat specific disorder based on results of diagnostic imaging, biopsy, and bacterial cultures

## Follow-Up Care

### PATIENT MONITORING

- Yellowish discoloration of the tissues due to problems before the liver (prehepatic icterus or jaundice)—recheck packed cell volume (PCV, a means of measuring the percentage volume of red blood cells as compared to the fluid volume of blood) and other blood tests, as needed, may need adjustment of therapy
- Yellowish discoloration of the tissues due to problems of the liver (hepatic icterus or jaundice) and problems after the liver (post-hepatic icterus or jaundice)—recheck bloodwork (serum biochemical profile) as dictated by underlying disease; continue symptomatic and specific treatment until controlled, varies by disease process

### PREVENTIONS AND AVOIDANCE

- Depend on underlying cause

### POSSIBLE COMPLICATIONS

- Depend on underlying cause
- Diseases causing yellowish discoloration of the body tissues (jaundice or icterus) may cause death, those with liver failure may have increased risk of infections, fluid build up in the abdomen, and digestive system bleeding

## **EXPECTED COURSE AND PROGNOSIS**

- Depend on underlying cause

## **Key Points**

- Yellowish discoloration to the gums and other tissues of the body (is known as “jaundice” or “icterus”)
- “Bilirubin” is a normal bile pigment formed from the breakdown of hemoglobin; “hemoglobin” is the compound in the red blood cells that carries oxygen to the tissues of the body; the liver takes up the hemoglobin following normal or abnormal breakdown of red blood cells and processes it to form bile (a fluid substance involved in digestion of fats), which provides a means of eliminating bilirubin from the body
- Bilirubin levels in the blood can increase because more bilirubin is being made by the liver—in this case, more red blood cells are being broken down (known as “hemolysis”) than usual, so the result is increased formation of bilirubin; bilirubin levels also can increase if the flow of bile is blocked (known as “cholestasis”)—in this case, the bilirubin is not eliminated from the body at a normal rate, this can happen at the liver (hepatic), or past the liver (post-hepatic)