

Thirsty, Tired Pet? His Liver May Be Trapping This Mineral

Occasionally, a change can occur in the liver that causes it to trap and accumulate a dietary mineral. The earlier you can detect this in your pet, the better, as this condition requires lifetime treatment. Find out the breeds at highest risk and 10 other telltale signs.

Reviewed by **Dr. Becker**

STORY AT-A-GLANCE

- Some pets, most often dogs, develop changes in the liver that trap dietary copper and cause a toxic disorder called copper storage disease
- Copper storage disease can be subclinical (no symptoms), acute or chronic and progressive
- Symptoms include lethargy, lack of appetite, excessive thirst and jaundice
- Pets with copper storage disease require lifetime treatment; the earlier your dog is diagnosed, the greater the chances he can live a normal and good-quality life
- A copper-free or low-copper, nutritionally balanced diet should be instituted immediately, along with supplements that support the liver

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Copper is an important trace element vital to the production of enzymes and other important cellular processes. Copper in your pet's diet is metabolized and stored in the liver, and the excess is excreted in bile and leaves the body via stool and urine.

Some animals are born with or develop changes in the liver that trap copper inside individual liver cells, resulting in toxicity. Copper storage disease is exactly what it sounds like. It's an abnormal accumulation of copper in the liver, which can lead to progressive damage and scarring of the liver, which is called cirrhosis. The condition is also known as copper storage hepatotoxicosis.

Pets at Highest Risk for Copper Storage Disease

Copper storage disease is most often seen in Bedlington, Skye and West Highland White terriers, as well as the Doberman Pinscher. Bedlington Terriers typically acquire chronic hepatitis as the result of an inherited trait that causes copper to stay in the liver instead of being eliminated from the body. Dogs with the gene typically develop acute liver necrosis before they are 6 years of age, however, breeding management has helped to decrease the number of cases.

In Dobermans, blood work can be abnormal as early as a year of age, but the disease doesn't usually become symptomatic until around age 7. In Westies and Skye terriers, the disease can occur at any time and copper accumulation can be apparent as early as one year. Dalmatians and Labs with the condition are typically middle-aged

and develop symptoms that are associated with chronic hepatitis. The condition can occur in cats, but thankfully, it's quite rare. Copper storage disease can be the result of:

- **Failure to excrete copper in the bile** — This is commonly the problem in Bedlington Terriers.
- **Excessive copper storage** — The liver can sometimes store too much copper, especially in cases of liver inflammation or chronic liver disease.
- **Excessive copper ingestion** — Too much copper consumed at one time or higher than normal amounts consumed over time can overwhelm the liver's storage capacity and cause liver damage, especially in dogs with a genetic tendency to excessive copper storage.

Categories and Symptoms of Copper Storage Disease

Copper storage disease generally falls into one of three categories:

1. Subclinical disease, which means the animal has the condition but no obvious symptoms
2. Acute disease, which is most often seen in young dogs and causes hepatic necrosis or death of liver tissue
3. Chronic, progressive disease, which usually occurs in middle-aged and older dogs with existing chronic liver disease and cirrhosis

Symptoms of the disease include:

- Lethargy
- Diarrhea
- Fluid build-up in the abdomen (ascites)
- Anorexia
- Excessive thirst and urination
- Dark-colored urine and hemoglobin in the urine
- Depression
- Jaundice (yellowing of the skin or mucous membranes)
- Spontaneous bleeding
- Vomiting
- Anemia
- Black or tarry stools

Occasionally there can also be nervous system disorders resulting from the liver's inability to break down ammonia in the body. This can lead to neurological symptoms like stumbling and circling.

Diagnosing and Treating Copper Storage Disease

Your veterinarian will take a complete history on your dog and perform a thorough physical exam, as well as diagnostic tests including a complete blood count (CBC), a biochemical profile, a urinalysis and a serum bile acids test. An abdominal ultrasound will be performed to evaluate the condition of the liver. A definitive diagnosis of copper storage disease also requires a liver biopsy, which will include quantifying the amount of copper in the liver.

Pets with copper storage disease require lifetime treatment. As with any disorder, the earlier your pet is diagnosed and treatment begins, the better his chances of living normally with a good quality of life. Treatment of this condition requires removing toxic levels of copper from the body, and preventing further accumulation.

The traditional veterinary approach to remove excess copper in the liver involves a drug called penicillamine, which helps chelate (bind) it, release it from liver tissues and promote excretion in urine. However, administration of copper-chelating agents in Dobermans is controversial because the disease tends to progress despite their use.

Diet and Supplement Recommendations

It's highly recommended that a homemade, copper-free diet be instituted as quickly as possible for severe conditions. All necessary nutrients must be provided at optimal levels except for copper. The diet needs to be formulated by a veterinary nutritionist, or someone who is capable of formulating a nutritionally balanced diet, minus the copper.

Another convenient option for mild to moderate conditions is to purchase a fresh, liver-friendly diet that's designed with lower than normal copper levels, such as Darwin's Intelligent Design liver support veterinary formula. It's very important that pets with copper storage disease receive optimal levels of zinc, because research shows that zinc is beneficial in binding copper and pushing it out of the body.

Research also shows that some animals with the disorder may have problems metabolizing the synthetic forms of copper used in many bulk pet food premixes. Increased levels of zinc can help reduce the amount of copper absorption in your pet's body. It's also important the diet includes optimal levels of vitamin B6 (pyridoxine), as it can also be beneficial in helping to remove excess copper from the body.

If you plan to feed your dog a commercial diet, it's important that it is formulated with very low levels of copper. Diets should be sourced from low-copper sources of protein, including beef, white meat chicken, turkey and eggs. Avoid organ meats, since they typically have higher amounts of copper.

Commercially available diets should have a copper content less than 0.5 parts per million. Less than 1 part per million of copper should be consumed through drinking water. If you're on well water, it's important it doesn't contain additional copper.

Vitamin C should also be avoided because it increases copper absorption. Supplements like vitamin E are recommended as antioxidant therapy to help reduce damage to the liver. Additional supplements that can be very beneficial are the antioxidant S-adenosylmethionine (SAME); Ursodiol, which helps promote bile flow; phosphatidylcholine, an anti-fibrotic agent; and milk thistle, which helps protect healthy liver cells.

Full recovery from copper storage disease is rare, but management is usually possible. At a minimum, most dogs with the condition must be fed a very low-copper diet for the remainder of their lives. This is also the best approach for young dogs with the condition to prevent the accumulation of copper in the liver before it becomes a problem.