



Copper Storage Disease in Dalmatians



An Informational Brochure
for
Dalmatian Owners & Breeders

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What is Copper Storage Disease

Copper Storage Disease (CSD) is a condition caused by an abnormal accumulation of copper in the dog's liver, which leads to progressive damage and scarring of the liver (cirrhosis). This condition may be secondary to a primary disease or the result of genetic-based abnormal copper metabolism. High liver copper levels can be toxic and lead to changes that compromise normal liver function. If left untreated, the symptoms can progress from hepatitis to liver failure. The Dalmatian is one of several breeds that may accumulate high amounts of copper in the liver. The disease has been shown to be genetic in origin in many different breeds, and there is already anecdotal evidence that genetics plays a role in the Dalmatian as well. To date, we do not yet have a complete understanding of the mode of transmission or the specific genetic defect involved in abnormal copper metabolism for the Dalmatian.

The current study funded by the Dalmatian Club of America Foundation through the AKC Canine Health Foundation hopes to define how the disease is transmitted as well as the Dalmatian specific genetic defect. One of the researchers involved with this study, Dr. David Twedt has published several papers on hepatic copper toxicosis in the Dalmatian that will provide additional resources for you and your Veterinarian.

A routine blood test can detect increased levels of liver enzymes indicating there is a problem with the liver. However, the blood tests cannot determine if the problems with the liver are due to increased copper levels. Diagnosis and differentiation from other types of liver disease can only be achieved by taking a liver biopsy and quantifying the copper levels in that sample. Once there is a confirmed diagnosis of Copper Storage Disease the treatment to reduce copper levels and prevent additional buildup is necessary. Early disease detection with treatment which includes a low copper diet improves the outcome for an affected dog.

Symptoms of Copper Storage Disease

This disease typically does not show obvious symptoms in the earlier stages. Unfortunately when symptoms of this disorder do appear they are common to many diseases which include several liver diseases so it may be easy to overlook CSD as the potential cause at the onset. If any of the symptoms below are observed see your Veterinarian as soon as possible.

- Weight loss
- Depression
- Weakness
- Increased Thirst
- Dehydration
- Anorexia
- Vomiting
- Lethargy
- Increased Urination
- Yellowing of skin/eyes

If your Dalmatian stops eating, it is not normal; you should visit your vet quickly and request a complete blood panel which includes liver value analysis. If your dog's liver enzymes are elevated, specifically the ALT value, it is important to consider that your dog may have Copper Storage disease. CSD is a significant possibility at this point; treatment and diagnosis should be initiated in a short time frame. Request that your Veterinarian follow the accepted protocol to determine if CSD is the cause. If they are not sure of that protocol, please request that they reach out to Veterinary teaching Universities which include but are not limited to Colorado State, Cornell, Ohio State, etc. The DCA Copper Storage Health Committee members can also be a source of information as well and may be contacted via information on the Dalmatian Club of American website. It is also suggested that you talk with the breeder of your dog to learn if there is any known history of CSD anywhere in the dog's pedigree. This information will be very important for the Veterinarian and the treatment of the dog. A liver biopsy will be needed for actual diagnosis and copper quantification. A biopsy report with copper measurement can take up to 2 week from time of biopsy. If critical symptoms initiated the need for biopsy and ALT values were elevated it is suggested that "treatment" with chelation therapy should begin before the report is received. Waiting to begin treatment could be the critical difference for the healthy outcome of the dog.

Diagnosis:

1. Abnormal liver enzymes (ALT)
2. Liver biopsy by Surgery, Needle or Laparoscopy
3. Analyses of the biopsy
 - Histopathology
 - Special Cu stains
 - 5X5mm or > diameter tissue
 - It is possible to measure Cu on paraffin embedded sample (after the fact)
 - Place in Cu free container
 - Cu quantitation

Prevention & Treatment

Early Detection & Prevention of Potential Critical Symptoms:

Early detection is critical; often the liver will have toxic levels of copper by the time symptoms arise which makes positive treatment outcome more difficult. Since CSD in the Dalmatian is believed to be associated to a genetic defect, acquiring the disease is not preventable but the onset of "critical life threatening" symptoms may be avoided if some specific steps are taken early in the life of the dog.

1. Ask questions and stay in contact with your dog's breeder. Knowledge about health issues that have come up anywhere in any generation of a pedigree is important to take note of for the long term health of your dog. Communicate this information to your Veterinarian so they have a good understanding of what to be attentive to in the dog's wellness exams.
2. Early detection is important for the avoidance of "critical life threatening symptoms" and the successful management of CSD. The suggested "best practice" is to do full bloodwork at 1 year (12 months), 18 months, 24 months and then yearly. If other signs are observed outside of the specified time frames noted it is recommended to see your Veterinarian with your concerns. This noted protocol is specifically important if you have been made aware that the dog comes from a pedigree that includes relatives either suspected of or fully diagnosed with CSD.
3. Pay attention to subtle changes with your dog's behavior. These subtle changes could be early signs that your dog is not feeling well.

Treatment:

Treatment involves the removal of toxic copper levels and the prevention of continued copper accumulation in the liver. This is achieved with chelating medications which pull the excess, toxic copper levels from liver and by reducing the intake of food and water that contain high levels of copper. Both are essential for successful treatment of this disease. CSD requires lifelong therapy which allows the dog to lead a normal, high quality life. There is no one specific treatment plan and the regimen selected may differ dependent on a specific dog's situation.

The chelation medication typically used is called Penicillamine or D-Pen. This medication removes copper from the liver and promotes copper excretion from the body in the urine.

Compounded formulations of Penicillamine at a dosage of (10-15 mg/kg q12 h) are typical. It is given on an empty stomach and may cause vomiting in some patients.

A diet (food & water) low in copper is an essential part of the treatment plan. This part of the treatment plan can be achieved with the use of low copper prescription diets such as RC Hepatic™ and Hills I/d™. Homemade diets can also be used but it is suggested to develop this plan with the assistance of a board certified Veterinary Nutrition Specialist to insure your dog gets all the nutrients needed specific to the circumstances of the individual dog. It is recommended that water provided be Distilled or filtered using a filter that verifies it removes copper to very low levels. Another part of the treatment plan often includes the addition of low copper supplements that promote improved liver health. These include but are not limited to, Vitamin E – an antioxidant & anti-fibrotic (anti-scarring) supplement, Vitamin B6 – supports copper reduction, and Denamarin – an antioxidant combined with a liver protective supplement.

What can you do?

1. If you have a purebred Dalmatian you can donate your dog's blood for current and future research. This is stored in a DNA bloodbank accessible for research studies. Reach out to members of the Dalmatian Club of America's Foundation to learn how to participate in this worthwhile endeavor.
2. If your dog has had or needs a liver biopsy have your Veterinarian contact the research team associated with the CSD research mentioned in this flyer. Georgina MacIntyre; gm3@ualberta.ca and David Twedt; david.twedt@colostate.edu. They will direct you how to proceed and participate in this worthwhile project.
3. Donate to the Dalmatian Club of America Foundation to help continue worthwhile research to help Dalmatians stay healthy .

If you are a Veterinarian?

If you need assistance with how to submit liver biopsies, blood samples, etc related to the CSD research study contact Georgina MacIntyre; gm3@ualberta.ca and David Twedt; david.twedt@colostate.edu

OTHER RESEARCH PAPERS ON COPPER STORAGE (click to link)

1. MSPCA-Angell Copper Hepatopathy in Dogs
2. Copper-Associated Liver Disease in Dalmatians: A Review of 10 Dogs (1998-2001)
3. Emerging Disease — Hepatopathy with Excessive Liver Copper in Dalmatians
4. GASTROENTEROLOGY Abnormal Liver Enzymes: Now What?
David C. Twedt, DVM, DACVIM

Websites to links above:

1. https://www.mspca.org/angell_services/copper-hepatopathy-in-dogs/
2. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1939-1676.2002.tb02405.x>
3. <http://csu-cvmb.colostate.edu/vdl/Pages/hepatopathy-liver-copper-dalmatians.aspx>
4. <https://vetfolio.s3.amazonaws.com/60/2e/93d1426a42518e6e0b15d076c10f/abnormal-liver-enzymes-now-what-pdf.pdf>

Your Dalmatians breeder as a resource:

Communicate with the breeder if your dog develops any symptoms of CSD. Breeders can be a great resource and it is important that the littermates and sire's owners are informed of potential problems. Breeders can be a lifelong resource and support.



DCAF RESEARCH GRANT INFORMATION:

<http://www.akcCHF.org/research/research-portfolio/2297.html>
All Copper related study information on CHF website:
<http://www.akcCHF.org/search/search.jsp?query=copper>

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