

# The Heart of the Matter: Taurine, Grain-Free Diets and Dilated Cardiomyopathy

by Nancy Hopkins

**T**here has been a great deal of discussion about the recently released information from Dr. Stern's lab at University of California at Davis (UC Davis) warning pet owners about findings implicating certain types of food in cases of Dilated Cardiomyopathy (DCM). This investigation is in the early stages and will be evolving rapidly as the powers of the veterinary cardiology community and the Food and Drug Administration (FDA) combine to solve this concerning mystery. Lets look at what taurine is, its history in animal nutrition, and what we know as of the time I submit this article.

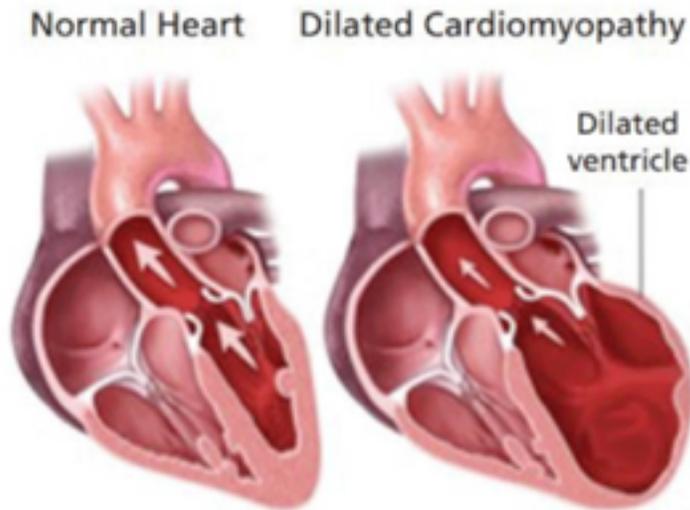
Taurine is an amino acid that is found in high levels in the heart muscle, retina, brain and central nervous system, olfactory bulb, and white blood cells. While taurine is an important nutrient, dogs can manufacture this amino acid from cystine and methionine using a process that requires at least two key enzymes. As long as there is nothing wrong with the dog's physiology or metabolism and its diet has sufficient amounts of usable cystine and methionine, no taurine deficiency should occur. Unlike dogs, cats cannot manufacture their own taurine. They must get taurine from their diet, which is where the story of taurine in animal nutrition begins.

In 1975, the research team of Hayes, Carey, and Schmidt showed that cats deficient in taurine could suffer from retinal degeneration. More research from a team headed by Sturman in 1986 showed that cats fed a taurine deficient diet suffered poor fetal development and reproductive failure. Then in 1987 a research team at the UC Davis School of Veterinary Medicine identified the cause of DCM that had been plaguing cats: dietary taurine deficiency. This form of taurine-deficiency DCM could be reversed once the cat was placed on a diet with adequate taurine. Many cat food manufacturers began adding taurine to their foods and the numbers of cats with DCM declined dramatically.

From the 1987 discovery through the 1990s the awareness that DCM might have a dietary cause led many veterinary cardiologists to investigate not only taurine, but other nutrients as well. Researchers did find some breeds that seemed to be predisposed to developing low taurine levels leading to DCM. In the mid-1990s UC Davis researchers identified American Cocker Spaniels with DCM that had low taurine levels. When these dogs were given diets supplemented with taurine, heart function improved. Some Newfoundland dogs were also identified as having reversible taurine-deficiency DCM. Two years later reversible DCM

linked to taurine deficiency was identified in a family of Golden Retrievers. Eventually, other breeds were added to the list of those at risk for taurine-deficiency DCM: St. Bernards, English Setters, Irish Wolfhounds, and Portuguese Water Dogs. However, in the majority of breeds, including those with high levels of DCM such as the Doberman Pinscher, the cause of DCM could not be linked to taurine deficiency.

More studies implicated certain types of foods as possible causes of taurine deficiency in dogs. These include lamb and rice diets, high fiber diets, and very-low protein diets. In the case of lamb and rice diets, lamb meal reportedly has lower amino acid digestibility with low availability of cystine, a building block of taurine. High fiber diets tend to cause loss of taurine.



With this information, dog food manufacturers began altering their foods to assure the proper availability of amino acids, even adding taurine in some cases. Because of this, since the early 2000s, the number of taurine-deficiency DCM cases appeared to decline.

After over 20 years of research, it is clear DCM in the majority of dogs is not caused by a clear nutritional deficiency. Genetics is suspected to be a major player in the development of DCM with proven genetic associations found in several breeds to date. Other less common potential causes that can mimic genetically caused DCM include taurine deficiency, carnitine deficiency (another amino acid), doxorubicin toxicity (a chemotherapeutic agent), immune-mediated disorders, arrhythmias, Chagas Disease, and viral infection. The prevailing hypothesis is that DCM has a multifactorial cause. In other words, genetic factors have a role, but other factors contribute to the eventual development of the disease.

Over the last few years, some cardiologists started to notice what seemed to be more frequent cases of DCM. More troubling was the fact that many of these were in breeds where this disease is not typical. At about the same time, Dr. Stern at UC Davis also noticed an increase in the number of Golden Retrievers with DCM. This led to the association between the surge of DCM cases and certain diets. The link was so strong the FDA became involved. As of July 12, 2018, it seems that grain-free foods with main ingredients that include legumes, pulses, potatoes and sweet potatoes (including proteins, flours, starches, or fiber derivatives made from these feed components) are involved. Foods that fall under the category of legumes and pulses include beans, peas, chickpeas, soy

beans, peanuts, lentils, vetch seeds, lupin seeds and pulses nes (which includes hyacinth, jack, sword, winged, guar, velvet, or yam beans). Neither rice nor derivatives of rice are implicated at this time. Main ingredients are defined by the FDA as those feed components listed before the first mineral or vitamin on the dog food ingredient list.

At first taurine deficiency appeared to be the major concern in these DCM cases. The majority of dogs appeared to be taurine deficient. However, as the investigation into this problem has ramped-up the association between taurine and cases of DCM is not as clear as suspected. In 8 recent cases reported to the FDA of grain-free diet linked DCM, half of them were not associated with low taurine levels. Whole blood taurine levels were low in three Golden Retrievers and one Labrador Retriever. The FDA report states that the Labrador Retriever is recovering with veterinary treatment (including taurine supplementation and diet change). The four other dogs had blood taurine levels in the normal range. These dogs included two Labrador Retrievers, a Shih Tzu, and a Miniature Schnauzer. From these findings, it is clear that there is still more we need to learn in order to understand what is causing some dogs on grain-free diets to develop DCM. It is also clear that while taurine deficiency may be seen in some dogs, we cannot assume taurine deficiency is the actual cause of grain-free diet associated DCM. This is something that was stressed by my cardiologist during a personal communication—the evidence is beginning to suggest that the DCM associated with grain-free diets may not be due to taurine deficiency.

I know that many people are very concerned about this issue. Believe me, I understand your concern. I have a dog who, for health reasons, is on a potato and venison diet. He has normal taurine and carnitine levels and is negative for Chagas Disease. He was also diagnosed with DCM at the age of 3 years thanks to his cardiologist's astute interpretation of a Holter test and insistence on a Doppler echocardiogram. The thought that his heart disease may be caused by his diet, something he trusts me to provide, is profoundly upsetting to me. However, I urge caution. We have to remember that the investigation into what is happening in relation to grain-free diets and DCM is at the early stages. Veterinary cardiologists and the FDA are working hard to give all of us some answers and solid, beneficial recommendations.

If you are concerned, what should you do? First, remember, only some dogs who are eating grain-free diets are developing DCM. So just because your dog is eating a pea and salmon dog food does not mean your dog is about to get sick and die. Right now, the scientists who are looking into this are not recommending that people immediately move away from grain-free diets because there is insufficient data at this time to provide such guidance.

If your dog is on a grain-free diet, discuss this issue with your veterinarian (or your dog's cardiologist). Your vet may recommend a diet change or careful monitoring. Watch your dog carefully for signs of a developing cardiac issue. One way to monitor your

dog is to count the breaths your dog takes during sleep or rest for one minute once a week and record this number (normal is 15-30 breaths per minute). If you see your dog's respiratory rate trending upward, alert your veterinarian. Watch for coughing, abdominal bloating, loss of appetite, fainting, or signs your dog has less energy or less interest in doing once loved activities.

If you are very concerned and want to know if your dog is developing DCM from a grain-free diet you can obtain a Doppler echocardiogram. A Doppler echocardiogram will identify cardiac changes due to DCM earlier than an x-ray. I personally have had two dogs with DCM and neither of them had a murmur even when examined just prior to death. Do not trust an auscultation to warn you of developing DCM.

If you have a dog with DCM, no matter what he eats, it is reasonable to test taurine and carnitine levels. If you live in the southern half of the US or the dog has been in this area, a test for Chagas Disease would not be a bad idea. The tests are especially important if your dog develops DCM at a young age (before the age of 7 yrs according to one source), or eats one of the following types of diets: lamb and rice, low protein, high fiber, exotic ingredient, homemade, vegetarian, raw, small company manufactured, or grain-free.

Also, do not simply start giving your dog taurine supplements. When I inquired about the possibility of giving my dog taurine supplementation, his cardiologist warned against adding taurine to the diet of a dog with normal taurine levels. Remember that all supplements are chemicals that have an impact on the body. Even the most beneficial nutrient can become harmful if eaten in too high a quantity. If you are thinking about supplementing taurine, test taurine levels first, then discuss it with your veterinarian. I know you want to do something to help your dog, just be sure that what you do will not do any more harm. Remember, we are still at the beginnings of an investigation into what is causing these cases of grain-free diet associated DCM. Rushing to conclusions may be a waste of money or harmful to your dog.

The FDA encourages both veterinarians and pet owners to report DCM cases that are suspected to be associated with a grain-free diet. To find out what you need to do to file a complaint, go to: <https://www.fda.gov/AnimalVeterinary/SafetyHealth/ReportaProblem/ucm182403.htm>

You can file a complaint directly through The Safety Reporting Portal which can be found at: <https://www.safetyreporting.hhs.gov/SRP2/en/Home.aspx?sid=b366d2d1-275a-497c-8c0f-aa55d-42fcfdc>

Watch your Borzoi, love them and keep them safe and well.